Chapter 5: Facility Impact Analysis

INTRODUCTION

The ***facility*** impact analysis assesses whether the MP&M effluent guidelines are likely to impose severe or moderate economic and financial impacts on MP&M facilities. EPA undertook the facility impact analysis to aid in assessing the rule's economic achievability. ***Severe impacts*** are facility closures and the associated losses in jobs, earnings, and output at facilities that close due to the rule. EPA also assessed moderate economic impacts to support its evaluation of regulatory options and to understand better the rule's economic impacts. ***Moderate impacts*** are adverse changes in a facility's financial position that are not threatening to its short-term viability.

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The options considered for regulation would have affected three major categories of MP&M facilities: privately-owned, railroad line maintenance, and government-owned facilities. EPA developed separate analytic methodologies to assess economic and financial impacts for each type of facility:

1. ***Private MP&M facilities***: This group includes all privately-owned facilities that do not perform railroad line maintenance. This major category of facilities operates in various subcategories and includes private businesses in a wide range of sectors or industries, including facilities that manufacture and rebuild railroad equipment. Only facilities that repair railroad track and equipment along the railroad line are excluded. There are 39,248 private MP&M facilities other than railroad line maintenance facilities nationally that may be affected by the rule, representing 89.5 percent of the 43,858 facilities that discharge process wastewater from MP&M activities.

2. ***Railroad line maintenance facilities***: Railroad line maintenance facilities maintain and repair railroad track and vehicles. EPA administered a separate economic and financial survey to these facilities and applied a different impact analysis methodology than that used for other private facilities. This methodology used the same impact tests as used for other private facilities but applied these tests to the aggregate of maintenance facilities owned by a single railroad company instead of to individual facilities. There are 826 railroad line maintenance facilities in the analysis, representing 1.9 percent of all facilities in the analysis.

3. ***Government-owned facilities***: Government-owned facilities include MP&M facilities operated by municipalities, state agencies and other public sector entities such as state universities. Many of these facilities repair, rebuild, and maintain buses, trucks, cars, utility vehicles (e.g., snow plows and street cleaners), and light machinery. Government-owned facilities operate in two major subcategories: General Metals and Oily Waste. There are 3,785 government-owned facilities in the analysis, representing 8.6 percent of the total.

The specific methodology used to assess impacts differs for each of the three types of MP&M facilities. In each case, EPA established thresholds for measures of financial performance and compared performance before and after compliance with each regulatory option to these thresholds.

This chapter describes the methodology used to assess facility-level economic impacts for the three types of facilities, and then presents the results of the analyses.

5.1 Data Sources

The economic impact analyses rely on data provided in the financial portion of the detailed questionnaires distributed to MP&M facilities by EPA under the authority of Section 308 of the Clean Water Act. The surveys were conducted in two phases, covering different MP&M industry sectors in each phase. The Phase I survey covered seven industry sectors and reported data for respondent's fiscal years 1987 to 1989. The Phase II survey covered an additional ten industry sectors (all remaining MP&M sectors except Iron and Steel, which was the subject of a separate survey) and reported data for fiscal years 1994 to 1996.[1] EPA administered each survey to a random stratified sample of facilities and assigned each facility a sample weight based on the stratification process and the number of facilities surveyed, so that sample-weighted results would represent all potentially-affected MP&M facilities at the national level. The results of the impact analyses for the sample facilities were extrapolated to the national level using these facility sample weights.

The survey financial data for private businesses included three years of facility and parent firm income statements and balance sheets, and the composition of revenues by MP&M business sector to which the facility's goods and services are sold.

Data for railroad line maintenance facilities came from a modified version of the Phase II survey administered to railroad operating companies. The questionnaire was modified because railroad operating companies generally do not monitor financial performance or collect financial data at the facility level for their numerous line maintenance facilities. The railroad operating companies reported the number of line maintenance facilities in each operating unit, and provided both operating company and parent firm financial data. They also provided technical data for each line maintenance facility.

Data for facilities in the Iron and Steel sector came from a 1997 Section 308 survey of iron and steel facilities. This survey requested financial data generally similar to that collected by the MP&M surveys, including income statements and balance sheets for fiscal years 1995-1997 for the facility and the parent firm.

Government-owned MP&M facilities provided data in the Phase II Section 308 survey of municipal and other government agency facilities. This survey requested information on fiscal year 1996 sources and amounts of revenue and debt levels for both the government entity and their MP&M facilities, and demographic data for the population served by the government entity.

In addition to the survey data, a number of secondary sources were used to characterize economic and financial conditions in the industries subject to the MP&M effluent guidelines. Secondary sources used in the analyses include:

- Department of Commerce economic census and survey data, including the *Censuses of Manufactures, Annual Surveys of Manufactures,* and international trade data;
- the *Benchmark Input-Output Tables of the United States*, published by the U.S. Department of Commerce's Bureau of Economic Analysis;
- price index series from the Bureau of Labor Statistics, Department of Labor;
- U.S. *Industry and Trade Outlook*, published by McGraw-Hill and the U.S. Department of Commerce; and
- industry trade publications.

5.2 Methodology

The facility impact analysis starts with compliance cost estimates from the EPA engineering analysis and then calculates how these compliance costs would affect the financial condition of MP&M facilities.[2] EPA first eliminated from the analysis those facilities showing materially inadequate financial performance in the baseline, that is, in the absence of the rule. EPA judged these facilities, which are referred to as ***baseline closures***, to be at substantial risk of financial failure regardless of any

[1] Appendix A provides a detailed description of the surveys and describes how EPA combined data from different surveys.

[2] EPA made several changes in the facility impact methodology between proposal and final regulation. These changes, which to a large degree address comments on the proposal impact methodology, are documented in the Notice of Data Availability (reference).

financial burdens that may result from the MP&M rule. Second, for the remaining facilities, EPA evaluated how compliance costs would likely affect facility financial health. In this analysis of compliance cost impact, EPA accounted for potential price increases that may help facilities recover compliance costs. EPA's estimate of potential price increases was based on a ***cost pass-through analysis***, which used historical input and output price changes for the years 1982 through 1991 to estimate how prices might change in response to regulation-induced production cost increases. A facility is identified as a ***regulatory closure*** if it would have operated under baseline conditions but would fall below an acceptable financial performance level when subject to the new regulatory requirements.

EPA also identified private MP&M facilities that would likely incur moderate impacts from the rule but that are not expected to close as a result of the rule. The test of moderate impacts examined two financial ratios pre-tax return on assets and interest coverage ratio calculated on a baseline and post-compliance basis. Incremental moderate impacts are attributed to the rule if both financial ratios exceeded threshold values in the baseline (i.e., no moderate impacts in the baseline), but at least one financial ratio fell below the threshold value in the post-compliance case.

5.2.1 Converting Engineering Compliance Costs and Survey Financial Data to Current Year Dollar Values

The facility survey data underlying the facility financial impact analysis are based on the periods 1987-1989 (Phase I) and 1994-1996 (Phase II). The estimates of costs for complying with the MP&M regulation were developed, however, in dollars of the year 1996, the baseline year of the MP&M regulatory analysis.[3] To ensure consistent impact analyses, EPA aligned facility financial data and compliance cost estimates in dollars of the same year. In addition, for understanding the significance of the rule's potential costs in today's economy, EPA further brought all dollar values forward to 2001. EPA used the following procedures to perform these adjustments.

EPA used the ***Construction Cost Index (CCI)*** to convert compliance cost estimates into 2001 constant dollar equivalents. The CCI is a price index that engineers often use to estimate costs associated with building, installing, and operating waste treatment equipment and facilities. The CCI includes the costs of labor and building materials in 20 major cities. Table 5.1 shows CCI values from 1996 to 2001.

Table 5.1: Construction Cost Index

Year	Value	% Change
1996	5620	
1997	5825	3.6%
1998	5920	1.6%
1999	6060	2.4%
2000	6221	2.7%
2001	6342	1.9%

Source: Engineering News-Record

EPA used the ***Producer Price Index (PPI)*** to bring MP&M survey financial data to the current year. The PPI measures average changes in selling prices that domestic producers receive for their output.[4] EPA used sector-specific PPI averages to

[3] The engineering cost estimates are described in the *Technical Development Document* accompanying this rule.

[4] EPA used the PPI to bring all financial statement values forward to 2001. EPA understands that the PPI is an output price index and that operating statement costs and balance sheet values may not change over time in the same way as output prices (and revenue). However, in adjusting financial statement values from the original survey data years to the current year, EPA's purpose is to bring the statement values forward to the present while preserving the cost and financial structure relationships as reflected in the original income statements and balance sheets. Accordingly, use of a single index is appropriate for this adjustment and EPA judged the industry-specific PPI values as a better basis for this adjustment than other non-industry specific measures of inflation.

update financial data from Phase I and Phase II survey respondents to 1996, the base year of the analysis. EPA applied an aggregate PPI to update from 1996 to 2001 dollars.

Table 5.2 shows aggregate PPI values for all finished goods. Prices increased by 6.6 (135.7/127.3) percent from 1996 to 2001, and by 32.3 percent from 1987 to 2001 (135.7/102.6).

Table 5.2: Producer Price Index Industrial Commodities

Year	Value	% Change
1987	102.6	
1988	106.3	3.6%
1989	111.6	5.0%
1990	115.8	3.8%
1991	116.5	0.6%
1992	117.4	0.8%
1993	119.0	1.4%
1994	120.7	1.4%
1995	125.5	4.0%
1996	127.3	1.4%
1997	127.7	0.3%
1998	124.8	-2.3%
1999	126.5	1.4%
2000	134.8	6.6%
2001	135.7	0.7%

Source: Bureau of Labor Statistics

5.2.2 Market-level Impacts and Cost Pass-Through Analysis

Increased costs from the regulation can be expected to affect industry-level prices and output. Changes in prices and output in turn determine the distribution of economic impacts among directly- and indirectly-affected industries and their customers and suppliers. The facilities and industries directly affected by the final rule might ultimately experience little adverse impact, for example, if they are able to recover most or all of their added costs by raising prices to their customers or by lowering the prices paid to their suppliers *and* without a material reduction on the production quantity sold. Some regulated facilities and companies could even be better off financially as a result of the rule, if they benefit from industry-wide product price increases and incur no or relatively-low compliance costs (e.g., if they already have treatment in place). Understanding impacts at the industry level is therefore important to understanding who bears the impacts of the rule.

The MP&M effluent guidelines affect facilities in a wide range of industries, and some of those industries produce a diverse slate of products that are sold in multiple industrial sectors. Detailed partial equilibrium modeling of product-level market dynamics in each of the affected industries was therefore not feasible. EPA instead used a combination of quantitative and qualitative methods to estimate a proportion of compliance costs that might be recovered through price increases in each MP&M sector. This cost pass-through analysis provided sector-specific coefficients that were applied to total compliance

costs in each sector to estimate percentage changes in prices and revenues. EPA then evaluated facility-level impacts assuming that all analyzed facilities in each sector benefit from the same percentage increase in prices and revenues.[5]

The estimated cost pass-through potential for each sector reflects an econometric analysis of historical pricing and cost trends in each MP&M industry sector, coupled with a qualitative market structure analysis. The market structure factors include:

- market power based on horizontal and vertical integration;
- extent of competition from foreign suppliers (in both domestic and export markets);
- barriers to competition, as indicated by above-normal, risk-adjusted profitability; and
- the long-term growth trend in the industry.

EPA developed cost pass-through coefficients that indicate the percentage of compliance costs that EPA expects firms subject to regulation to recover from customers through increased revenues.[6] This approach may either overstate or understate the true changes in revenue for any one particular facility, depending on the diversity of products produced by the facility and the percentage of competitors in each product market that incur compliance costs.

This approach to estimating market-level adjustments is a simplification because it does not simultaneously estimate changes in prices and output. Instead, EPA estimated price changes and then estimated changes in output based on predicted closures, taking into account the effect of the predicted price increases on facilities' financial performance. It is difficult to assess how this simplified approach might affect the estimated economic impacts of the rule. However, EPA does not believe that the overall impact analysis results are highly sensitive to the potential biases introduced by this approach.

5.2.3 Impact Measures for Private Facilities

a. Test of severe impacts

The analysis of severe impacts estimates the number of facilities that could potentially close due to the regulation. EPA predicted that a facility will close if compliance costs cause the facility's overall financial performance and resulting implied financial value to fall below a specified threshold level. Compliance costs are determined by the type and number of processes that a facility performs, the characteristics of its wastewaters, and the level of treatment performed in the baseline. EPA took the number and type of processes and pollutants produced into account when subcategorizing the industry. However, EPA was not able to link estimated compliance costs to specific products. Nor was EPA able to link facility financial performance to specific products. It was therefore not possible to conduct an impacts analysis at the product level.

In particular, the analysis does not consider output reductions short of closure for example, closing one of several production lines/processes or continuing to produce the same products at a reduced level. It is quite possible that a facility with no or relatively low compliance costs for most processes could choose to out-source products made using a process that had significant compliance costs associated with it, instead of performing the process in-house. This is particularly true if it is a process that is performed infrequently. It is also possible that firms with multiple facilities could consolidate similar processes at individual facilities to reduce their compliance costs. These situations are not considered in this economic impact analysis. Numerous compliance responses are available to firms and facilities that EPA is unable to model. In addition, the analysis of severe impacts does not attempt to forecast future business circumstances for a facility and thus does not account for potential improvements in business outlook that might strengthen a facility's ability to afford compliance outlays and thus prevent a potential closure decision. Because of these unknowns, estimated severe impacts are worst case and are likely to be overstated. In addition, the relationship between the compliance costs associated with the specific processes performed, specific products made from these processes, and the multiple industrial sectors to which these products are sold, is unknown and can not be accounted for in this analysis.

[5] EPA also performed an analysis in which complying facilities are assumed to pass none of their compliance costs through to consumers (zero-cost pass-through analysis). The results of this analysis are in the in the Record to the final rule (see Section *25.3.2*, DCN *37070*).

[6] Appendix B provides a detailed description of the cost pass-through analysis.

The assessment of severe impacts for MP&M private facilities[7] is based on the change in the facility's estimated business value, as determined from a discounted present value analysis of baseline cash flow and the change in cash flow resulting from regulatory compliance. If the estimated discounted cash flow value of the facility is positive before considering the effects of regulatory compliance but becomes negative as a result of compliance outlays, then the facility is considered a regulatory closure. In this impact test, the estimated ongoing business value of the facility is compared with a threshold value of zero for the closure decision: as long as the discounted cash flow value of the facility is greater than zero, the business is earning its cost of invested capital and continuation of the business is warranted. If the discounted cash flow value of the facility is less than zero in the baseline or becomes less than zero as a result of compliance outlays, then the business will not earn its cost of invested capital and the business owners will be better off financially by terminating the business. As noted in earlier discussion, facilities for which EPA estimated a negative baseline value were considered baseline closures and were not tested for additional adverse impacts from regulatory compliance.

In an alternative, theoretically more accurate, formulation of this concept, business owners would compare the discounted cash flow value of the facility with the value that the facility's assets would bring in liquidation. In this case, the estimated ongoing business value would be compared with a value that may be different from zero: ***liquidation value*** could be positive or negative. When liquidation value is positive, business owners might benefit financially by terminating a business and seeking its liquidation value even when the ongoing business value is positive but less than the estimated liquidation value. With negative liquidation value which generally would result from business termination liabilities (e.g., site clean-up) the opposite result could occur: business owners may find it financially advantageous to remain in business *even though the business earns less than its cost of invested capital* if the liquidation value of the business is "more negative", and thus less in value, than the ongoing business based on the discounted cash flow analysis. EPA attempted to implement this alternative impact test formulation. However, liquidation values were unavailable for over 75 percent of sample facilities. Moreover, EPA judges that the liquidation value estimates are substantially speculative and subject to considerable error. For these reasons, EPA decided against using liquidation value for comparison with ongoing business value in the closure test.

The cash flow concept used in calculating ongoing business value for the closure analysis is ***free cash flow*** available to all capital. Free cash flow is the cash available to the providers of capital both equity owners and creditors on an after-tax basis from business operations, and takes into account the cash required for ongoing replacement of the facility's capital equipment. Free cash flow is discounted at an estimated after-tax total ***cost of capital*** to yield the estimated business value of the facility. Details of the calculation of free cash flow and the discounting of free cash flow to yield the facility's estimated value are explained in the following sections.

❖ *Calculation of Baseline Free Cash Flow and Performance of Baseline Closure Test*

Calculation of baseline free cash flow and performance of the baseline closure test involved the following steps:

1. *Average survey income statement data over response years and convert to 2001 dollars:* EPA averaged income statement data over the years for which survey respondents reported data. For example, if a facility reported income statement data for 1995, 1996, and 1997, then a simple average was calculated for the three reported years. Reported values were brought forward from the initial reporting period to 1996 using MP&M sector-specific PPI adjustment factors and then from 1996 to 2001 using an aggregate PPI value as described above.

2. *Calculate after-tax income excluding the effects of financial structure:* The questionnaire responses include a calculation of after-tax income in accord with conventional accounting principles. However, this calculation reflects the financial structure of the business, which may include debt financing and thus interest charges against income. Because the cash flow concept to be discounted in the business value analysis is cash flow available to *all* capital, it is necessary to restate after-tax income to exclude the effects of debt financing, or on a *before-interest* basis. This restatement involves: (1) increasing after-tax income by the amount of interest charges and (2) increasing taxes (and thereby reducing after-tax income) by the amount of tax reduction provided by interest deductibility. This adjustment amounts to adding tax-adjusted interest expense to after-tax income and yields an estimate of after-tax income *independent of capital structure or financing effects*. In calculating the tax adjustment for interest, EPA used a combined federal/state corporate income tax rate of 39 percent, which reflects a combination of an approximate average state rate of 7.5 percent and a federal rate of 34 percent with state taxes deductible from federal income tax liability. After-tax income, *before interest,* was calculated as follows:

[7] As opposed to non-business, government entities.

$$\text{ATI-}BI = \text{ATI} + \text{I} - \tau\text{I} \textit{ or} \quad \text{ATI-}BI = \text{ATI} + (1 - \tau)\text{I} \tag{5.1}$$

where:

ATI-*BI*	=	after-tax income *before interest*;
ATI	=	after-tax income from baseline financial statement;
I	=	interest charge from baseline financial statement; and
τ	=	estimated combined federal-state tax rate of 39 percent.

3. *Calculate after-tax cash flow from operations, before interest, by adjusting income for non-cash charges:* The calculation of after-tax income may include a non-cash charge for depreciation (and potentially amortization). To calculate ***after-tax cash flow (ATCF)*** from operations, it is therefore necessary to add back any depreciation charge to the calculation of after-tax income, before interest. Cash flow, *before interest*, was calculated as follows:

$$\text{ATCF-}BI = \text{ATI-}BI + \text{D} \tag{5.2a}$$

where:

ATCF-*BI*	=	after-tax cash flow *before interest*;
ATI-*BI*	=	after-tax income *before interest*; and
D	=	baseline depreciation.

4. *Calculate free cash flow by adjusting after-tax cash flow from operations for ongoing capital equipment outlays:* The measure of after-tax cash flow from the previous step, cash flow from operations, reflects the cash receipts and outlays from ordinary business operations and includes no allowance for replacement of the facility's existing capital equipment. However, to sustain ongoing operations, a business must expend cash for capital replacement. Accordingly, to understand the true cash flow of a business and thus provide a conceptually valid cash flow measure for business valuation, it is necessary to reduce cash flow from operations by an allowance for capital replacement. For the calculation of free cash flow, EPA estimated baseline capital outlays from a regression analysis of capital expenditures by public firms in the MP&M business sectors over a 10-year period (details of this analysis and estimation framework are contained in Appendix D). Free cash flow is calculated as follows:

$$\text{FCF} = \text{ATCF-}BI - \text{CAPEX} \tag{5.2b}$$

where:

FCF	=	free cash flow
ATCF-*BI*	=	after-tax cash flow *before interest*; and
CAPEX	=	estimated baseline capital outlays.

Or on a more detailed accounting statement basis:

$$\text{FCF} = \text{REV} - \text{TC} - \text{T} - \tau\text{I} - \text{CAPEX} \tag{5.2c}$$

where:

FCF	=	free cash flow
REV	=	revenue
TC	=	total operating costs, *excluding interest, depreciation, and taxes*
T	=	baseline income tax
τ	=	estimated combined federal-state tax rate of 39 percent;
I	=	interest charge from baseline financial statement; and
CAPEX	=	estimated annual baseline capital outlays.

This calculation of free cash flow is based on a static representation of a facility's business. Revenue and expenses are not projected forward and the analysis of the business assumes, in effect, that the facility's business will continue in the future absent the effects of regulation exactly as reflected in the baseline financial statements provided in the survey questionnaire. Consistent with this framework, the estimation of free cash flow includes no adjustment for changes in working capital, which might ordinarily be included in the capital outlay adjustment to operating cash flow.

5. *Calculate baseline facility value as the present value of free cash flow over a 15-year analysis horizon:* To calculate baseline business value, EPA discounted free cash flow over a 15-year period at an estimated real (i.e., excluding the effects of inflation), after-tax cost of capital of 7 percent. The use of 15 years as the discounting horizon reflects the expected useful life of capital equipment to be installed for MP&M regulation compliance. Facility baseline business value is calculated as follows:

$$VALUE = \sum_{t=0}^{14} \frac{FCF}{(1 + CoC)^t} \quad (5.3)$$

where:

VALUE	=	estimated baseline business value of the facility
FCF	=	free cash flow
CoC	=	after-tax cost-of-capital; and
t	=	year index, t = 0-14 (15-year discounting horizon).

In the present value calculation, yearly cash flows accrue at the beginning of the year. As a result, the first year of cash flows is not discounted i.e., t = 0 for the first year of the analysis and cash flows in the fifteenth and final year of the analysis period are discounted over a 14-year period i.e., t = 14 in the final year of the analysis.

As explained above, EPA considered a facility to be a baseline closure if its estimated business value was negative before incurring regulatory compliance costs. Baseline closures were not tested for adverse impact in the post-compliance impact analysis.

❖ *Calculation of Post-Compliance Free Cash Flow and Performance of Post-Compliance Closure Test*

For the post-compliance closure analysis, EPA recalculated annual free cash flow accounting for changes in revenue, operating costs, and taxes that are estimated to result from compliance-related outlays. EPA combined the post-compliance free cash flow value and the estimated compliance capital outlay in the present value framework to calculate business value on a post-compliance basis.

Calculation of post-compliance free cash flow and performance of the post-compliance closure test involved the following steps:

1. *Adjust baseline annual free cash flow to reflect compliance revenue and expense effects:* Compliance-related effects on annual free cash flow include compliance ***operating and maintenance (O&M)*** expenses, post-compliance change in revenue (from the compliance ***cost pass-through analysis***), and change in taxes. The change in taxes includes: (1) the tax effect of compliance expense and revenue changes and (2) the tax effect from depreciation of compliance capital outlays. For calculating the tax effect of depreciation, EPA assumed that compliance capital outlays would be depreciated for tax purposes on a 15-year straight-line schedule. Post-compliance free cash flow was calculated as follows:

$$FCF_{PC} = FCF_{BL} + \Delta REV - \Delta TC - \tau(\Delta REV - \Delta TC - \Delta D) \quad (5.4)$$

where:

FCF_{PC}	=	post-compliance free cash flow;
FCF_{BL}	=	baseline free cash flow, as calculated above;
ΔREV	=	post-compliance change in revenue, as calculated in the cost pass-through analysis;
ΔTC	=	change in total facility operating costs (excluding interest, depreciation and taxes), calculated as operating and maintenance costs of compliance;
τ	=	marginal tax rate for calculating compliance-related tax effects (combined federal-state tax rate of 39 percent); and
ΔD	=	change in depreciation expense, calculated as compliance capital outlay (CC) divided by 15.

The operating and maintenance cost of compliance (ΔTC, above) is the change in costs estimated to result from operating and maintaining pollution controls adopted to comply with effluent guidelines. Operating costs include the costs of monitoring.

2. *Limit tax adjustment to not exceed taxes as reported in baseline financial statement:* The tax effect of compliance will generally be to reduce tax liability. That is, in the prior formulation, the term $\tau(\Delta REV - \Delta TC - \Delta D)$, which is the tax effect of compliance, will generally be negative as the increase in revenue will be less than compliance-related operating expenses and compliance equipment depreciation: $(\Delta TC + \Delta D) > \Delta REV$. As a result, in the free cash flow calculation, the tax adjustment will generally increase cash flow and business value and, all else equal, will reduce the likelihood that a facility will fail the post-compliance closure test. However, the extent to which a facility will realize this contribution to cash flow depends on its tax circumstances. In particular, some businesses may not be paying sufficient taxes in the baseline to take full benefit of the implied tax reduction *at the facility level* unless the unused tax loss can be transferred to other, profitable business units in the firm, these businesses will not be able to use fully the implied tax reduction on a current basis. Also, the marginal tax rate for businesses with relatively lower pre-tax income may be less than the assumed 39 percent rate used in the analysis. While businesses may be able to carry forward tax losses to reduce taxes in later years, EPA recognizes that the implied cash flow benefit from tax reduction may not be fully realized, particularly in circumstances involving single-facility firms. To be conservative in its analysis, EPA therefore limited the amount of tax reduction from compliance outlays to be no greater than the amount of tax paid by facilities in the baseline financial statement. The analysis effectively assumes that facilities will not be able to offset an implicit negative tax liability against positive tax liability elsewhere in its operations or to carry forward (or back) the negative income and its implicit negative tax liability to other positive income/positive tax liability operating periods. On average, this approach will overstate impacts on facilities, because some MP&M businesses may be able to benefit from tax reductions that exceed facility baseline taxes, especially if the facility is owned by a multiple-site firm. Accordingly, EPA constrained the tax effect term in the free cash flow calculation, $[-\tau(\Delta REV - \Delta TC - \Delta D)]$ as specified above, to be no greater than baseline financial statement tax liability, T.

3. *Calculate post-compliance facility value, including post-compliance free cash flow and the compliance capital outlay:* As in the baseline analysis, EPA calculated post-compliance facility value as the present value of free cash flow and accounting for the compliance capital outlay as an undiscounted cash outlay in the first analysis period. Facility post-compliance business value was calculated as follows:

$$VALUE_{PC} = \sum_{t=0}^{14} \frac{FCF_{PC}}{(1 + CoC)^t} - CC \qquad (5.5)$$

where:

$VALUE_{PC}$	=	estimated post-compliance business value of the facility
FCF_{PC}	=	estimated post-compliance free cash flow
CoC	=	after-tax cost-of-capital;
t	=	year index, t = 0-14 (15-year discounting horizon); and
CC	=	compliance capital outlay.

EPA considered a facility to be a post-compliance closure if its estimated business value was positive in the baseline but became negative after adjusting for compliance-related cost, revenue and tax effects. In addition to tallying closure impacts in terms of the number of estimated facility closures, EPA also measured the significance of closures in terms of losses in employment and output. Employment losses equal the number of employees reported by closure facilities in survey responses; output losses equal total revenue reported for regulatory closure facilities. EPA estimated national results by multiplying facility results by facility sample weights.

b. Test of moderate impacts

EPA also conducted an analysis of financial stress short of closure to identify the rule's moderate impacts. Facilities experiencing moderate impacts are not projected to close due to the MP&M effluent guidelines. The rule, however, might reduce their financial performance to the point where they might have difficulty obtaining financing for future investments.

The analysis of moderate impacts examined two financial measures:

Pre-Tax Return on Assets (PTRA): ratio of pre-tax operating income earnings before interest and taxes (EBIT) to assets. This ratio measures the operating performance and profitability of a business' assets independent of financial structure and tax circumstances. PTRA is a comprehensive measure of a firm's economic and financial performance. If a firm cannot sustain a competitive PTRA on a post-compliance basis, it may have difficulty financing its investments, including the outlay for compliance equipment.

Interest Coverage Ratio (ICR): ratio of pre-tax operating cash flow earnings before interest, taxes, and depreciation (EBITDA) to interest expense. This ratio measures the facility's ability to service its debt on the basis of current, ongoing financial performance and to borrow for capital investments. Investors and creditors will be concerned about a firm whose operating cash flow does not comfortably exceed its contractual obligations. The greater the ICR, the greater the firm's ability to meet interest payments, and, generally speaking, the greater the firm's credit-carrying ability. ICR also provides a measure of the amount of cash flow available for equity after interest payments.

Creditors and equity investors review the above two measures as criteria to determine whether and under what terms they will finance a business. PTRA and ICR also provide insight into a firm's ability to generate funds for compliance investments from internally-generated equity, i.e., from after-tax cash flow. The measures are defined as follows:

Pre-Tax Return on Assets

$$PTRA = \frac{EBIT}{TA} \tag{5-6}$$

where:

PTRA = pre-tax return on assets,
EBIT = pre-tax operating income, or *earnings before interest and taxes*, and
TA = total assets.

Or, stated in terms of MP&M income statement accounts,

$$PTRA = \frac{REV - (TC + D)}{TA} \tag{5.7}$$

where:

PTRA = pre-tax return on assets;
REV = revenue;
TC = total operating costs (excluding interest, taxes, and depreciation/amortization);
D = depreciation; and
TA = total assets.

Interest Coverage Ratio

$$ICR = \frac{EBITDA}{I} \tag{5.8}$$

where:

ICR = interest coverage ratio;
EBITDA = pre-tax operating cash flow, or *earnings before interest, taxes, and depreciation (and amortization)* and
I = interest expense.

Or, stated in terms of MP&M income statement accounts,

$$ICR = \frac{REV - TC}{I} \quad (5.9)$$

where:

PTRA = pre-tax return on assets;
REV = revenue;
TC = total operating costs (excluding interest, taxes, and depreciation/amortization); and
TA = total assets.

Including the effects of MP&M compliance costs, post-compliance PTRA and ICR are:

$$PTRA_{pc} = \frac{[(REV + \Delta REV) - (TC + \Delta TC + D + \Delta D)]}{(TA + CC)} \quad (5.10)$$

$$ICR_{pc} = \frac{[(REV + \Delta REV) - (TC + \Delta TC)]}{(I + \Delta I)} \quad (5.11)$$

where:

$PTRA_{pc}$ = pre-tax return on assets, post-compliance;
ICR_{pc} = interest coverage ratio, post-compliance;
ΔREV = post-compliance change in revenue, as calculated in the cost pass-through analysis;
ΔTC = change in total facility operating costs (excluding interest, depreciation and taxes), calculated as operating and maintenance costs of compliance;
ΔD = change in depreciation expense, calculated as compliance capital outlay (CC) divided by 15;
CC = compliance capital outlay (assuming all of the outlay would be capitalized and reported as an addition to assets on the balance sheet); and
ΔI = incremental interest expense from financing of compliance capital outlay. As a simplifying, conservative assumption, incremental interest expense is calculated assuming that the compliance capital outlay is fully debt financed at the overall real cost-of-capital of 7 percent. The annual incremental interest value is calculated as the annualized value of interest payments over 15 years, assuming a constant annual payment of principal and interest.

For evaluating MP&M facilities according to the moderate impact measures, EPA compared baseline and post-compliance PTRA and ICR to MP&M sector-specific thresholds that were developed from data compiled by Risk Management Association, Inc. (RMA). RMA compiles and reports financial statement information by industry as provided by member commercial lending institutions. The threshold values represent the 25th percentile values of PTRA and ICR for statements received by RMA for the eight years from 1994 to 2001 within relevant industries. EPA developed MP&M sector-level values by weighting and summing the RMA industry values according to the definition of MP&M sectors (see Appendix C for details of moderate impact threshold development and sector-specific threshold values). Thresholds by sector ranged from 0 to 3.1 percent for PTRA and from 1.4 to 2.9 for ICR. Because the financial statements received by RMA are for businesses applying for credit from member institutions, the data don't represent a random sample. In particular, the RMA data will likely exclude representation from the financially weakest businesses, which are unlikely to be seeking credit. As a result, EPA views the threshold values as being relatively conservative and likely to overstate the occurrence of moderate impacts.

Both measures are important to financial success and firms' ability to attract capital. Facilities failing at least one of the moderate impact measures in the baseline were deemed to be already experiencing moderate financial weakness and were not tested for additional financial impact in the moderate impact analysis. Facilities that passed both moderate impact tests in the baseline but failed one or both threshold comparisons, post-compliance, were considered to incur moderate financial impacts, short of closure, as a result of the MP&M regulation.

5.2.4 Impact Measures for Railroad Line Maintenance Facilities

The proposed MP&M rule would have applied to some railroad facilities that maintain and repair railroad track and that perform similar operations on railroad and other vehicles. Railroad representatives indicated during data collection that the industry does not collect or monitor significant financial data at the facility level. These discussions led EPA to administer a modified version of the survey to railroad operating units and to perform the primary economic impact analysis at the operating unit level.

The analysis of impacts for railroad line maintenance facilities uses the same measures of impact as for other private MP&M facilities, but applies these measures for the railroad operating unit as a whole. Compliance costs for each railroad are the sum of compliance costs at each MP&M railroad line maintenance facility identified by the operating company.

5.2.5 Impact Measures for Government-Owned Facilities

Government-owned MP&M facilities include all facilities owned by government entities that discharge process wastewater from MP&M activities. Most government-owned facilities that fall under the MP&M rule provide or support transportation services. These facilities repair, rebuild, and maintain buses, trucks, cars, utility vehicles (e.g., snow-plows and street cleaners), and light machinery. The MP&M profile describes government-owned facilities in detail.

Each government subject to the MP&M effluent guidelines at its facilities has a number of choices, which include:

- contracting out the service to a private provider or other governmental agency,
- discontinuing these services altogether, or
- paying for compliance and continuing operations.

The impact analysis does not predict how the government will respond. The analysis evaluates only whether a community incurring compliance costs and continuing operations under the rule would incur a severe burden. A government may choose a different option and avoid some of the budgetary impacts estimated here.

EPA evaluated impacts for government-owned facilities by using three tests. A government that fails all three tests is likely to suffer severe adverse impacts as a result of the rule. The first test is applied at the facility level, and the other two tests are applied at the government level.

a. Impacts on site-level cost of service test

The impacts on site-level cost of service test considers whether a government-owned facility's compliance costs exceed one percent or more of its total baseline cost of service. This test is similar to the test used to assess impacts on private facilities and firms, which compares costs to post-compliance revenues. The facility will likely absorb compliance costs within its current budget if those costs do not exceed one percent of the total. Compliance costs in this scenario will not significantly impact the municipal budget. Costs in excess of one percent do not, in and of itself, indicate that a budgetary impact will occur, but only that additional analysis should be performed to determine if there is an impact.

EPA calculated the ratio of compliance costs to cost of service, R_C, for each government-owned facility as follows:

$$R_C = \frac{TACC}{C_{Baseline}} \qquad (5.12)$$

where:

R_C = ratio of compliance costs to cost of service,
TACC = total annualized compliance cost for the facility, and
$C_{Baseline}$ = total baseline cost of service at the facility.

A facility whose R_C is equal to or greater than one percent fails this test.

b. Impacts on taxpayers test

The impacts on taxpayers test evaluates the significance of compliance costs to the people served by the government. A government will fail this test if the ratio of total annualized pollution control costs per household to median household income exceeds one percent, post-compliance. Post-compliance pollution control costs include all pollution control costs (for whatever purpose) reported by the government in the baseline plus the sum of MP&M effluent guideline compliance costs at all MP&M facilities owned by the government. This test closely follows the methodology developed for EPA's Water Quality Standards Workbook (EPA, 1995).

The survey requests information about current municipal expenditures on pollution control. ***Total annualized compliance costs (TACC)*** for each government-owned facility is the sum of costs and an amortized capital cost. The sum of TACC at all MP&M facilities for each government, plus baseline municipal expenditures on pollution control, yields a post-compliance total annualized pollution control cost. EPA divided total annualized pollution control costs by the number of households to calculate an average cost per household. The questionnaire also asks for median household income in the geographic area served by the responding government.

EPA calculated a ratio of compliance costs to median household income, R_H, for each government as follows:

(5.13)

$$R_H = \frac{C_{BPB} + \sum_i TACC_i}{MHI}$$

where:

R_H = ratio of total annualized pollution control cost to median household income,
C_{BPC} = total baseline municipal expenditures on pollution control, and
$TACC_i$ = total annualized compliance cost for government-owned facility *i,*
MHI = median household income for the government jurisdiction.

Governments that incur compliance costs that cause this ratio to exceed one percent fail this test. Governments that fail this test in the baseline as well as post-compliance are not judged to experience major budgetary impacts attributable to the rule. If the rule causes an increase in this ratio to above one percent, then EPA concludes that the rule might present a burden to the taxpayers that support the affected government. The calculation is a conservative estimate of the impact on taxpayers because it does not take into account the fact that non-residential taxpayers (businesses) will bear some of the tax burden or that some costs might be recovered in fees.

This test is used in EPA's *Economic Guidance for Water Quality Standards*. This guidance is used by States and EPA Regions to assess economic factors in setting or revising water quality standards. The guidance includes as a screening measure of economic impact, average total pollution control cost per household divided by median household income. A value less than one percent indicates that a community would incur "little economic impact".[8]

c. Impacts on government debt test

The impacts on government debt test assesses the government's ability to finance compliance with the rule by issuing debt. A government must be able to finance capital compliance costs in addition to meeting ongoing compliance costs. Governments often finance capital compliance costs by issuing debt. This criterion tests each government's capacity to issue debt by examining the ratio of post-compliance debt service costs to the government's total revenue. This measure is analogous to the interest coverage ratio for private firms.

The ratio of debt service costs to revenue, R_D, for each government is:

[8] Source: EPA's *Economic Guidance for Water Quality Standards: Workbook* (1995) (Chapter 2 "Evaluating Substantial Impacts: Public Sector Entities"). Values between one and two percent indicate potential "mid-range economic impact." Governments with values above one percent are subject to further analysis to determine whether a significant economic impact would in fact occur.

(5.14)

$$R_D = \frac{D_B + C_k}{TR_B}$$

where:

R_D = debt-to-revenue ratio;
D_B = baseline municipal debt service costs (principal payments and interest);
C_k = annualized capital cost of compliance, summed over all government-owned facilities in each government; and
TR_B = baseline municipal revenue.

EPA judged that debt service costs above 25 percent of revenues might impede a government's ability to issue debt in the future and present a burden on the budget.

This criterion is used in EPA's MUNIPAY model. This model is used in enforcement cases to assess whether municipalities (e.g., towns, villages, cities, counties, and public utilities) can afford to pay a specific level of compliance costs, Superfund cleanup contributions, or penalties. The model's affordability assessment limits the amount of debt that can finance these costs, capping the debt service ratio at 25 percent.[9] A higher ratio "may reduce the confidence of creditors that the municipality can repay its debt on time." The MUNIPAY manual states that this value slightly exceeds the "warning marks" found in the public finance and management literature.

5.3 RESULTS

This section presents the results of the facility impacts analyses. The first section presents the results of the baseline closure analysis. The subsequent sections report the results of the analyses for the rule and the three other regulatory options that EPA analyzed. Section 5.3.2 presents the predicted price increases. Section 5.3.3 presents an overview of impacts for all MP&M facilities, and then results are provided for indirect dischargers (Section 5.3.4), direct dischargers (Section 5.3.5), private facilities (Section 5.3.6), and government-owned facilities (Section 5.3.7). Section 5.3.8 provides results by subcategory.

5.3.1 Baseline Closures

Table 5.3 shows the results of the baseline closure analysis by subcategory. EPA estimated that a total of 3,593 facilities have a negative business value before incurring regulatory compliance costs. These facilities are projected to close in the baseline and are not considered in the analysis of impacts attributable to the regulation.

Appendix A provides information on typical average closure rates in the MP&M industry sectors. Census data show that over 10,000 facilities, or almost eight percent of all facilities in these industries, close annually. The number of baseline closures predicted in this analysis is consistent with this typical closure rate.

[9] Source: EPA Office of Compliance and Enforcement Assurance, *MUNIPAY User's Manual*, September 1999, p. 4-14.

Table 5.3: Summary of Baseline Closures

Subcategory	Total Number of Dischargers	Number of Baseline Closures	Percent Closing in the Baseline	Number Operating in the Baseline
General Metals	11,364	880	7.7%	10,484
Metal Finishing Job Shops	1,542	50	3.2%	1,491
Non-Chromium Anodizing	122	29	23.8%	93
Oily Wastes	29,185	2,409	8.3%	27,776
Printed Wiring Boards	848	239	28.2%	609
Railroad Rebuilders	826	0	0.0%	826
Shipbuilding Dry Dock	14	0	0.0%	14
All Subcategories[a]	43,858	3,593	8.2%	40,265

[a] The total number of facilities does not sum to the number of facilities by subcategory because some facilities operate in more than one subcategory and have an indirect and direct discharging operation within the same facility.

Source: U.S. EPA analysis

5.3.2 Price Increases

The price increases predicted for the final rule and alternative regulatory options are shown in Table 5.4. The percentage price increases are small, falling well below one-half of one percent for all sectors under the final rule.

Table 5.4: Cost Pass-Through Analysis: Percentage Price Increases by Regulatory Option and Sector

Sector	Option I: Selected Option (Directs Only)	Option II: Proposed/NODA Option	Option III: Directs + 413 to 433 Upgrade	Option IV: Directs + All to 433 Upgrade
Aerospace	0.00%	0.04%	0.00%	0.00%
Aircraft	0.00%	0.03%	0.00%	0.01%
Bus and Truck	0.00%	0.06%	0.00%	0.01%
Electronic Equipment	0.00%	0.04%	0.00%	0.00%
Hardware	0.00%	0.08%	0.01%	0.01%
Household Equipment	0.00%	0.02%	0.00%	0.00%
Instrument	0.00%	0.08%	0.00%	0.01%
Iron and Steel	0.00%	0.20%	0.00%	0.00%
Job Shop	0.00%	0.61%	0.09%	0.09%
Mobile Industrial Equipment	0.00%	0.16%	0.01%	0.01%
Motor Vehicle	0.00%	0.07%	0.00%	0.00%
Office Machine	0.00%	0.00%	0.00%	0.00%
Ordnance	0.00%	0.12%	0.00%	0.00%
Other Metal Products	0.00%	0.04%	0.00%	0.01%
Precious and Non-Precious Metals	0.00%	0.03%	0.00%	0.00%
Printed Circuit Board	0.00%	0.00%	0.00%	0.00%
Railroad	0.00%	0.02%	0.00%	0.00%
Ships and Boats	0.00%	0.03%	0.00%	0.00%
Stationary Industrial Equipment	0.00%	0.05%	0.01%	0.01%

Source: U.S. EPA analysis

5.3.3 Overview of Impacts

Table 5.5 provides an overview of the numbers of facilities closing and experiencing moderate economic impacts, by regulatory option. These national estimates include all types of dischargers (direct and indirect) and types of facilities (private MP&M, railroad line maintenance, and government-owned facilities.)

Table 5.5: Regulatory Impacts for All Facilities by Option, National Estimates

	Option I: Selected Option (Directs Only)	Option II: Proposed/NODA Option[a]	Option III: Directs + 413 to 433 Upgrade	Option IV: Directs + All to 433 Upgrade
Number of facilities operating in the baseline: total	40,265	60,253	40,265	40,265
private MP&M and railroad line maintenance	*36,480*	*54,526*	*36,480*	*36,480*
government-owned	*3,785*	*5,727*	*3,785*	*3,785*
Number of facilities below low flow cutoffs		51,502		
Number of facilities with subcategory exclusions	37,883	136	36,820	36,339
Percent of facilities operating in the baseline excluded or below cutoffs	94.1%	85.7%	91.4%	90.3%
Number of facilities operating subject to regulatory requirements	2,382	8,615	3,445	3,926
Number of regulatory closures	0	785	120	120
Percent of facilities operating in the baseline that are regulatory closures	0.0%	9.1%	3.5%	3.1%
Number of facilities experiencing moderate impacts	0	257	37	49
Percent of facilities operating in the baseline that experience moderate impacts	0.0%	3.0%	1.1%	1.2%

[a] The total number of facilities reported for the Proposed/NODA Option (Option II) analysis differs from the facility count reported for the final rule and Options III and IV. After deciding in July 2002 to not consider the NODA option as the basis for the final rule, EPA performed no more analysis on the NODA option, including not updating facility counts and related analyses for the change in subcategory and discharge status classifications. These differences in facility counts by regulatory option appear in subsequent tables.

Source: U.S. EPA analysis.

Table 5.5 shows that the final rule substantially reduces facility-level impacts as compared to the three alternative regulatory options considered by EPA. None of the facilities that continue to operate in the baseline close or experience moderate impacts due to the final rule. The large difference in results between the final rule and other options stems largely from the exclusion from regulatory requirements of over 94 percent of facilities that continue to operate in the baseline: the final rule excludes from regulatory requirements all indirect dischargers and direct dischargers in all subcategories except for Oily Wastes. Significantly larger numbers of facilities are projected to close under the Proposed/NODA Option and 433 Upgrade Options (785 and 120 facilities, respectively). See Chapter 4 for a discussion of the options and subcategory exclusions.

Table 5.6 shows the estimated burden on facilities from regulatory compliance by option, discharge status, and subcategory. The estimated burden includes annualized compliance costs and any estimated increase in facility revenue as a result of the regulation, and, for private facilities, reflects the effects of taxes on compliance costs and revenue. These compliance costs therefore represent the total after-tax cash flow impact on regulated facilities.

Table 5.6: Total Annualized Facility[a] After-tax Compliance Costs by Subcategory, Discharge Status, and Regulatory Option (millions, 2001$)

Subcategory	Option I: Selected Option (Directs Only)		Option II: Proposed/NODA Option		Option III: Directs + 413 to 433 Upgrade		Option IV: Directs + All to 433 Upgrade	
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect
General Metals	$0.0	$0.0	$267.6	$476.7	$0.0	$16.5	$0.0	$46.5

Metal Finishing Job Shop	$0.0	$0.0	$2.9	$139.9	$0.0	$8.2	$0.0	$8.2
Non-Chromium Anodizing	$0.0	$0.0	$23.1	$0.0	$0.0	$0.0	$0.0	$0.0
Oily Waste	$11.9	$0.0	$29.0	$72.3	$12.0	$0.0	$12.1	$0.0
Printed Wiring Board	$0.0	$0.0	$0.2	$106.4	$0.0	$15.0	$0.0	$15.0
Railroad Line Maintenance	$0.0	$0.0	$0.6	$0.0	$0.0	$0.0	$0.0	$0.0
Shipbuilding Dry Dock	$0.0	$0.0	$2.4	$0.0	$0.0	$0.0	$0.0	$0.0
Steel Forming & Finishing[b]			$25.5	$16.1				
All Categories: Annual Costs	$11.9	$0.0	$351.2	$811.4	$12.0	$39.7	$12.1	$69.7
All Categories: Number of Facilities Operating Post-Compliance Subject to Requirements	2,382	0	4,143	3,688	2,382	1,063	2,382	1,544
Total Costs to Industry by Option, Directs + Indirects	$11.9		$1,162.5		$51.7		$81.8	

[a] This table reflects after-tax cash flow impacts to facilities and does not represent the cost of society from regulatory compliance. Chapter 11 discusses the social costs of the final rule and the other options. The estimates in this table exclude baseline and regulatory closures, and are after-tax.

[b] The Steel Forming & Finishing subcategory was removed from the MP&M universe after deciding not to consider the Proposed/NODA Option (Option II) for the final rule. As a result, compliance costs are included in the Steel Forming & Finishing subcategory for Option II only.

Source: U.S. EPA analysis.

Oily Wastes direct dischargers account for the total compliance costs of $11.9 million under the final rule. Total compliance costs incurred by facilities that continue to operate post-compliance are almost 100 times higher under the Proposed/NODA Option than under the final rule, over four times higher under the Directs and 413 to 433 Upgrade Option than under the final rule, and almost seven times higher under the Directs and All to 433 Upgrade Option than under the final rule.

5.3.4 Results for Indirect Dischargers

The sum of facilities individually identified as indirect and direct dischargers exceeds the total of all facilities as identified in Table 5.5, above. Some facilities operate in more than one subcategory, and some have both an indirect and direct discharging operation in the same facility. Facilities with both indirect and direct discharging operations are reported in the tables for both discharge categories: Table 5.7, for indirect dischargers, and Table 5.8, for direct dischargers.

Table 5.7 summarizes the results of the facility impact analysis for indirect dischargers, including both private businesses and government-owned facilities.

Table 5.7: Regulatory Impacts for Indirect Dischargers by Option, National Estimates

	Option I: Selected Option (Directs Only)	Option II: Proposed/ NODA Option	Option III: Directs + 413 to 433 Upgrade	Option IV: Directs + All to 433 Upgrade
Number of facilities operating in the baseline: total	37,652	56,071	37,652	37,652
private MP&M and railroad line maintenance	*34,325*	*51,066*	*34,325*	*34,325*
government-owned	*3,327*	*5,005*	*3,327*	*3,327*
Number of facilities below low flow cutoffs		51,502		
Number of facilities with subcategory exclusions	37,652	136	36,589	36,108
Percent of facilities operating in the baseline excluded or below cutoffs	100.0%	92.1%	97.2%	95.9%
Number of facilities operating in the baseline subject to regulatory requirements	0	4,433	1,063	1,544
Number of regulatory closures	0	746	120	120
Percent of facilities operating in the baseline and subject to regulatory requirements that are regulatory closures	0.0%	16.8%	11.3%	7.8%
Number of facilities experiencing moderate impacts	0	228	37	49
Percent of facilities operating in the baseline and subject to regulatory requirements that experience moderate impacts	0.0%	5.1%	3.5%	3.2%

Source: U.S. EPA analysis.

Indirect discharging facilities account for over 93 percent of water discharging MP&M facilities as a whole. However, because all indirect discharging are excluded from regulatory requirements under the final rule, EPA estimates that no indirect dischargers will incur impacts under the final rule.

5.3.5 Results for Direct Dischargers

Table 5.8 summarizes the facility impact results for direct dischargers, which represent approximately seven percent of all facilities that continue to operate in the baseline. In addition, most operating direct dischargers are subject to requirements under the final rule: only 10 percent are excluded from requirements as a result of subcategory exclusions. As shown in the table, EPA estimates that no direct dischargers will close or incur moderate impacts as a result of the final rule's requirements. Impacts on direct dischargers are the same under the 433 Upgrade Option impacts as under the final rule, since these Options apply the same requirements to the same universe of facilities. The Proposed/NODA Option would have yielded more regulatory closures and moderate impacts than the final rule and 433 Upgrade Options.

Table 5.8: Regulatory Impacts on Direct Dischargers by Option, National Estimates

	Option I: Selected Option (Directs Only)	Option II: Proposed/NODA Option	Option III: Directs + 413 to 433 Upgrade	Option IV: Directs + All to 433 Upgrade
Number of facilities operating in the baseline	2,641	4,182	2,641	2,641
private MP&M and railroad line maintenance	*2,183*	*3,459*	*2,183*	*2,183*
government-owned	*458*	*722*	*458*	*458*
Number of facilities with subcategory exclusions	259	0	259	259
Percent of facilities operating in the baseline with subcategory exclusions	9.8%	0.0%	9.8%	9.8%
Number of facilities operating in the baseline subject to regulatory requirements	2,382	4,182	2,382	2,382
Number of regulatory closures	0	39	0	0
Percent of facilities operating in the baseline and subject to regulatory requirements that are regulatory closures	0.0%	0.9%	0.0%	0.0%
Number of facilities experiencing moderate impacts	0	28	0	0
Percent of facilities operating in the baseline that experience moderate impacts	0.0%	0.7%	0.0%	0.0%

Source: U.S. EPA analysis.

5.3.6 Results for Private Facilities

Table 5.9 provides the facility impact analysis results for privately-owned facilities, including Railroad Line Maintenance facilities. Because privately-owned facilities account for over 90 percent of all MP&M facilities operating in the baseline, these results are similar to the results reported for all MP&M facilities in Table 5.5. Almost 95 percent of facilities operating post-compliance are excluded from requirements under the final rule, due to the subcategory exclusions for all indirect dischargers and all direct dischargers except for Oily Wastes.

Table 5.9: Regulatory Impacts for Private Facilities by Option, National Estimates

	Option I: Selected Option (Directs Only)	Option II: Proposed/NODA Option	Option III: Directs + 413 to 433 Upgrade	Option IV: Directs + All to 433 Upgrade
Number of facilities operating in the baseline	36,480	54,526	36,480	36,480
Number of facilities below low flow cutoffs		46,582		
Number of facilities with subcategory exclusions	34,556	136	33,123	32,745
Percent of facilities operating in the baseline excluded or below cutoffs	94.7%	0.2%	90.8%	89.8%
Number of facilities operating in the baseline subject to regulatory requirements	1,924	7,808	3,357	3,735
Number of regulatory closures	0	785	120	120
Percent of facilities operating in the baseline and subject to regulatory requirements that are regulatory closures	0.0%	10.1%	3.6%	3.2%
Number of facilities experiencing moderate impacts	0	257	37	49
Percent of facilities operating in the baseline and subject to regulatory requirements that experience moderate impacts	0.0%	3.3%	1.1%	1.3%

Source: U.S. EPA analysis.

5.3.7 Results for Government-Owned Facilities

Table 5.10 provides facility impact analysis results for government-owned facilities. The 3,785 government-owned facilities that continue to operate in the baseline represent over 9 percent of all MP&M facilities operating in the baseline. As discussed above, instead of a closure test, the impact analysis for government-owned facilities assesses whether the rule would impose major budgetary impacts on these facilities and the governments that own them.

Under the final rule, 88 percent of government-owned facilities would be excluded from requirements because they qualify for subcategory exclusions. EPA's analysis indicates that none of the options would impose major budgetary impacts on the governments operating the facilities.

Table 5.10: Regulatory Impacts for Government-Owned Facilities by Option, National Estimates

	Option I: Selected Option (Directs Only)	Option II: Proposed/NODA Option	Option III: Directs + 413 to 433 Upgrade	Option IV: Directs + All to 433 Upgrade
Number of government-owned facilities operating in the baseline & post-regulation	3,785	5,727	3,785	3,785
Number of facilities below low flow cutoffs		4,920		
Number of facilities with subcategory exclusions	3,327	0	3,327	3,305
Percent of facilities operating in the baseline excluded or below cutoffs	87.9%	85.9%	87.9%	87.3%
Number of facilities operating subject to regulatory requirements	458	807	458	480
Number of facilities experiencing significant budgetary impacts[a]	0	0	0	0
Percent of facilities operating in the baseline that experience significant budgetary impacts	0%	0%	0%	0%

[a] A government is judged to experience major budgetary impacts if (1) any of its facilities incur compliance costs exceeding 1% of baseline cost of service and (2) the governmental unit fails both the taxpayers impact and government debt impact tests.

Source: U.S. EPA analysis.

Tables 5.11 and 5.12 provide additional detail on the results of the facility impact analysis for government-owned facilities. Table 5.11 shows the number of government-owned facilities by type and size of government, and the number that fall below relevant flow cutoffs under the final rule.

Table 5.11: Number of Government-Owned Facilities by Type and Size of Government Entity

	Municipal Government	State Government	County Government	Regional Governmental Authority	Total
Large Governments (population> 50,000)					
# of regulated government entities	26	129	23	0	178
# of government entities with exclusions	592	248	758	46	1,645
Small Governments (population <= 50,000)					
# of regulated government entities	280	0	0	0	280
# of government entities with exclusions	1,470	0	212	0	1,682
All Governments					
# of regulated government entities	306	129	23	0	458
# of government entities with exclusions	2,062	248	970	46	3,327
Total	2,368	377	993	46	3,785

Source: U.S. EPA analysis of Municipal Survey.

Table 5.12 provides additional information on the results of the three tests performed in the government impact analysis. The vast majority of facilities, 95.7 percent, are estimated to incur costs less than one percent of their baseline cost of service. EPA assumes that these facilities (and their owning governments) can absorb compliance costs within their current budgets with no material burden. The remaining 162 facilities, or 4.3 percent of government-owned facilities, incur costs exceeding one percent of their baseline costs of service. Although EPA estimates that these facilities will incur costs exceeding the one percent no-impact threshold, whether these costs represent a material burden to the owning government depends on the magnitude of costs at the government level. To understand whether this higher facility-level cost would constitute a significant burden, EPA estimated the total of compliance costs incurred by a government for all of its affected MP&M facilities and assessed the impact of these costs under the two tests outlined above: the taxpayer impact test and the government debt service impact test. For the final rule, EPA estimated that none of the governments with facilities incurring costs greater than one percent of baseline values would fail either of the two government-level impacts tests.

Table 5.12: Impacts on Governments of MP&M Facility Compliance Costs by Size of Government

	Owned by Small Governments		Owned by Large Governments		All Government-Owned Facilities	
Number of government-owned MP&M facilities affected	1,962		1,823		3,785	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Number and percent of governments failing all three budgetary impact criteria	0	0.0%	0	0.0%	0	0.0%
Individual Test Results: number and percent of failures						
Compliance costs > one percent of baseline cost of service test	140	7.1%	22	1.2%	162	4.3%
Impacts on taxpayers test	0	0.0%	0	0.0%	0	0.0%
Impacts on government debt test	0	0.0%	0	0.0%	0	0.0%

Source: U.S. EPA analysis.

That no governments incur budgetary impacts at the government level is not surprising. The MP&M activities regulated under the final rule typically represent a very small portion of governments' budgets. Even a significant percentage increase in the cost of MP&M activities (as measured by the comparison of post-regulation costs to baseline costs) is unlikely to present any serious burden on the budgets of the affected governments.

Moreover, the costs to government-owned facilities are quite low. The large majority (3,327 or 88 percent) of the 3,785 government-owned facilities are excluded from the final rule. Of the 458 government facilities remaining under regulation, 183 facilities incur no costs, and 275 incur annualized costs averaging $32,674.

GLOSSARY

after-tax cash flow (ATCF): After-tax cash flow available to equity.

baseline closures: Facilities showing inadequate financial performance in the baseline, that is, in the absence of the rule. These facilities closures would have occurred with or without the rule.

Construction Cost Index (CCI): Measures how much it cost to purchase a hypothetical package of goods and services compared to what is was in the base year. It applies to general construction costs. The CCI can be used where labor costs are a high proportion of total costs. The CCI uses 200 hours of common labor, multiplied by the 20-city average rate for wages and fringe benefits. (http://www.enr.com/cost/costfaq.asp)

cost of capital: Costs incurred for a firm to obtain financing from all capital sources including, in particular, equity and debt.

cost pass-through analysis: Calculates the percentage of compliance costs that EPA expects firms subject to regulation to recover from customers through increased revenues.

facility: A contiguous set of buildings or machinery on a piece of land under common ownership.

free cash flow: Cash flow generated by the company that is available to all providers of the company's capital, both creditors and shareholders.

government-owned facility: Includes facilities operated by municipalities, state agencies and other public sector entities such as state universities.

interest coverage ratio (ICR): Ratio of cash operating income to interest expenses. This ratio measures the facility's ability to service its debt and borrow for capital investments.

liquidation value: Net amount that could be realized by selling the assets of a firm after paying the debt. (http://www.duke.edu/~charvey/Classes/wpg)

moderate impacts: Adverse changes in a facility's financial position that are not threatening to its short-term viability.

operating and maintenance (O&M): Costs estimated to result from operating and maintaining pollution controls adopted to comply with effluent guidelines. Operating costs include the costs of monitoring.

pre-tax return on assets (PTRA):Ratio of cash operating income to assets. This ratio measures facility profitability.

private MP&M facility: Includes all privately-owned facilities that do not perform railroad line maintenance.

Producer Price Index (PPI): A family of indexes that measures the average change over time in the selling prices received by domestic producers of goods and services. PPI's measure price change from the perspective of the seller. This contrasts with other measures, such as the Consumer Price Index (CPI), that measure price change from the purchaser's perspective. Sellers' and purchasers' prices may differ due to government subsidies, sales and excise taxes, and distribution costs. (http://stats.bls.gov/ppifaq.htm#1)

railroad line maintenance facility: Facilities that maintain and repair railroad track and other vehicles.

regulatory closure: A facility that is predicted to close because it can not afford the costs of complying with the rule.

severe impacts: Facility closures and the associated losses in jobs, earnings, and output at facilities that close due to the rule.

total annualized compliance cost (TACC): Sum of annual operating and maintenance costs and the annualized equivalent of one-time costs, calculated over 15 years assuming a seven percent discount rate.

ACRONYMS

ATCF:	after-tax cash flow
CCI:	construction cost index
ICR:	interest coverage ratio
O&M:	operation and maintenance
PPI:	producer price index
PTRA:	pre-tax return on assets
TACC:	total annualized compliance cost

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Chapter 6: Employment Effects

INTRODUCTION

CHAPTER CONTENTS

This chapter discusses the employment effects associated with the final rule and the alternative regulatory options considered by EPA. The MP&M regulation can generate both positive and negative impacts on employment. Any facility closures induced by the rule would result in reduced demand for labor and compliance activities at facilities that close, but would also increase employment requirements in facilities that remain open and continue to operate. The regulation could also create a demand for compliance-related equipment and installation, which would also generate new employment requirements.

EPA assumed that any estimated facility closures would result in the loss of ***full-time equivalents (FTEs)***.

The MP&M rule may affect overall employment in three ways.

Direct labor requirements. Direct labor requirements are job losses from closures and job gains from manufacturing, installing, and operating compliance-related equipment. Direct labor requirements also include labor to implement the rule's pollution prevention activities.[1]

Indirect labor requirements. Compliance expenditures may increase employment in industries doing business with compliance equipment and service providers. Economists refer to these as ***linked industries***. For example, a firm that manufactures a treatment system will purchase pumps, pipes, and other intermediate goods and services from other firms and sectors of the economy. Employment in these linked industries increases when treatment equipment manufacturers purchase goods and services from them. Closures of MP&M facilities can also lead to reduced requirements for inputs to MP&M industry products, and therefore indirect job losses in the supplier industries.

Induced labor requirements. Increased direct and indirect labor employment also increases spending on consumer-oriented service and retail businesses. Economists refer to the additional labor demand in the businesses patronized by people working in the direct and indirect labor industries as "induced" labor requirements. Conversely, people who are laid off from MP&M facilities that close due to the rule may spend less, reducing employment in sectors providing consumer services and products.

EPA is not including a total estimate of indirect and induced job gains and losses, however, because the magnitude of losses and gains is very small at the national level and occur across all states. The job gains after the first three years are expected to be approximately two jobs per year, without any regulation-related losses. The low magnitude of these gains means that it is highly unlikely that there will be any material secondary and induced impacts from the regulation.

Because EPA estimates that no facility closures will occur under the final rule, EPA expects that the rule will cause no job losses. However, EPA estimates that the regulation will increase employment, with the manufacture and installation of compliance equipment causing a short-term gain in direct employment of 20 FTEs. In addition, EPA estimates that operation and maintenance of compliance equipment will cause a continuing direct requirement for two FTEs per year. The net effect on direct employment of the regulation is an estimated increase of 47 ***FTE-years***, a measure that reflects both the number and duration of jobs gained. This number represents an average gain of three FTEs per year over the 15 year analysis period.

Although EPA expects no job losses under the final rule, EPA considered other regulatory options that would likely have caused facility closures and job losses. The following sections of this chapter review first the job losses from facility closures under the alternative regulatory options, and second the expected job gains from compliance equipment installation and

[1] See the *Technical Development Document* for more information on compliance costs.

operation for both the final rule and the alternative options. The last section discusses net impacts on employment and the expected timing of those effects.

6.1 Job Losses Due to Closures

As discussed, EPA estimates that the final rule will cause no facility closures and thus no job losses.[2] However, EPA considered other regulatory options that would likely cause facility closures and job losses. To calculate job losses for these options, EPA assumed that all employees working at closing facilities will lose their jobs, and that one-third of the facilities estimated to close do so in each of the first three years after promulgation of the option. The §308 surveys provide the number of employees at each facility, expressed in FTEs. The job losses attributable to an option are simply the sum of employment at the plants estimated to close. EPA did not analyze the job losses that would occur if facilities cut production or ceased production of products that required certain processes instead of closing. Table 6.1 shows the total employment and estimated job losses by subcategory due to facility closures under the alternative regulatory options and as a percent of the total employment in the baseline.

Table 6.1: Job Losses for the Alternative Regulatory Options by Subcategory; Final Rule

Subcategory	Total Employment in the Baseline	Option I: Selected Option	Option II: NODA/Proposed Option		Option III: 413 to 433 Upgrade Option		Option IV: All to 433 Upgrade Option	
			Estimated Job Losses	% of Total Jobs	Estimated Job Losses	% of Total Jobs	Estimated Job Losses	% of Total Jobs
General Metals	3,641,623	n/a	7,895	0.2%	6,087	0.2%	6,087	0.2%
Metal Finishing Job Shop	63,083	n/a	19,072	30.2%	1,425	2.3%	1,425	2.3%
Non-Chromium Anodizing	13,464	n/a	0	0.0%	0	0.0%	0	0.0%
Oily Waste	3,143,544	n/a	104	0.0%	0	0.0%	0	0.0%
Printed Wiring Board	110,644	n/a	3,998	3.6%	363	0.3%	363	0.3%
Railroad Rebuilders[a]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Shipbuilding Dry Dock	994	n/a	0	0.0%	0	0.0%	0	0.0%
Steel Forming and Finishing[b]	21,753		1,660	7.6%				
All Subcategories	6,973,352	n/a	32,729	0.5%	7,874	0.1%	7,874	0.1%

[a] Employment is only available at the firm level for the Railraod Rebuilders subcategory.
[b] The Steel Forming & Finishing subcategory was removed from the MP&M universe after deciding not to consider the Proposed/NODA Option (Option II) for the final rule. As a result, estimated job losses are included in the Steel Forming & Finishing subcategory for Option II only. Accordingly, the employment from this subcategory is not included in the total.

Source: U.S. EPA analysis.

Job losses under the Proposed/NODA Option equal 0.5 percent of total employment at water discharging MP&M facilities and 0.1 percent under the 433 Upgrade Options. The metal finishing job shop subcategory accounts for 19,072 of the job losses under the Proposed/NODA Option or over 58 percent of the total 32,729 estimated job losses. The subcategories with the highest percent of job losses under the Proposed/NODA Option are the Metal Finishing Job Shops (30.2 percent of total employment in the subcategory), Steel Forming and Finishing (7.6 percent) and Printed Wiring Boards (3.6 percent). Job

[2] EPA's analysis considers employment losses only for facility closures. As discussed in Chapter 5, firms may consider a range of responses in structuring a compliance strategy, including consolidation and/or transfer of production among facilities to minimize the financial burden of compliance. In some instances, these actions could result in employment losses in some facilities and possible increases in others. Because of the complexity of these decisions, EPA's analysis cannot consider the full range of such compliance responses and does not consider the potential employment effects – negative or positive – associated with these compliance options.

losses under the 433 Upgrade Options are estimated in the General Metals, Metal Finishing Job Shops, and Printed Wiring Boards subcategories of 6,087, 1,425, and 363 employees, respectively.

6.2 Job Gains Due to Compliance Requirements

Direct labor requirements arise from the employment necessary to manufacture, install, and operate equipment that MP&M facilities need to comply with the final rule, as well as pollution prevention activities undertaken to comply with the regulation. The following sections discuss labor requirements associated with manufacturing compliance equipment, equipment installation, and operation, respectively. This section provides a detailed analysis for the final rule only. A summary of the net job gains due to compliance with the alternative regulatory options is presented at the end of the section. Some more detail on the compliance costs that went into calculating job gains under the alternative regulatory options is available in Appendix E.

a. Direct labor requirements for manufacturing compliance equipment

EPA estimated the direct labor requirements for manufacturing wastewater treatment systems using three steps:

- Calculate the cost of compliance equipment;
- Estimate the share of the cost of compliance equipment due to labor inputs. This estimate shows how much money goes to employees of equipment manufacturers; and
- Convert the dollars spent on manufacturing employees to a full-time employment equivalent (FTE), based on a yearly labor cost.

❖ *Compliance cost*

EPA used the total one-time capital costs estimated by the engineers to calculate the purchase cost paid to manufacturers of compliance equipment. The estimated one-time direct capital equipment cost is $3.1 million for the final regulatory option. Appendix E explains in more detail how this value was calculated.

❖ *Labor share*

The Bureau of Economic Analysis (BEA) calculates ***direct requirements coefficients*** that measure how many dollars of each input are purchased to produce a dollar of a given output.[3] EPA used requirements coefficients for BEA Sector 40, the "Heating, Plumbing, and Fabricated Structural Metal Products Industry," for the employment analysis. MP&M project engineers identified BEA Sector 40 as the industrial sector that most nearly matches the businesses that would make, install, and operate waste treatment systems for MP&M facilities complying with the rule. The inputs into Sector 40 production include intermediate goods, materials, and services, as well as labor.

BEA's direct requirements table shows that every dollar of Sector 40 output delivered to final demand requires $0.30632 expended to compensate Sector 40 employees. Multiplying labor's share of output value (30.63 percent) by the value of compliance equipment purchases for the regulation ($3.1 million) yields the labor cost of manufacturing treatment system equipment: $0.9 million.

❖ *FTE jobs*

EPA converted the total labor cost to the number of FTE-equivalent jobs by dividing the total labor cost by an estimated yearly labor cost per FTE employee. EPA used the hourly labor rate used in the engineering cost analysis – $29.67 per hour in 1996 dollars. The $29.67 per hour rate includes fringe benefits (e.g., holidays, vacation, and various insurances) and payroll taxes. EPA adjusted this amount to 2001 dollars using the Bureau of Labor Statistics Employment Cost Index for manufacturing of durable goods, to provide an hourly rate in 2001$ of $34.69. The gross 2001 dollar annual labor cost per FTE position for a 2,000-hour work year is $69,373. EPA estimated that one-time spending on manufacturing treatment system equipment would require 14 FTEs (941 (in thousands) / 69.4). EPA assumed that one-third of facilities come into compliance in each of the first three years, therefore, one-third of these FTEs (5) would be associated with equipment purchases in each of the first three years after promulgation of the rule.

[3] See "Benchmark Input-Output Accounts for the U.S. Economy, 1992," in *Survey of Current Business*, July 1997, U.S. Department of Commerce, Bureau of Economic Analysis.

b. Direct labor requirements for installing treatment systems

EPA's method for estimating the direct labor requirements to install treatment system equipment parallels its method for analyzing the labor requirements for equipment manufacturing.

❖ *Compliance cost*

EPA used the total one-time capital costs estimated by the engineers to calculate the cost of installation. The estimated one-time cost of installation labor is $0.5 million for the final regulatory option. Appendix E explains in more detail how this value was calculated.

❖ *Labor share*

One hundred percent of the installation is a labor cost.

❖ *FTE jobs*

EPA used the loaded hourly labor cost of $34.69 per hour and 2,000 hours per year to convert labor costs to numbers of FTE jobs. Complying facilities will require an estimated 7 FTEs (455 (in thousands) / 69.4) to install the equipment needed to comply with the regulation. This corresponds to 2 FTEs in each of the first three years after promulgation of the rule.

c. Direct labor requirements for operating and maintaining treatment systems

MP&M project engineers estimated that labor costs represent one percent of total compliance operating and maintenance (O&M) costs. For the final rule, the labor cost of O&M is $0.1 million per year (2001$), corresponding to 2 FTEs (131 (in thousands) / 69.4). EPA assumed that one-third of facilities come into compliance in each of the first three years after promulgation of the rule. Therefore, one-third of these FTEs (1) would have operating maintenance requirements in the first year, two-thirds of these FTEs (1) would have operating maintenance requirements in the second year, and all of these FTEs (2) would have operating maintenance requirements in the third year when all facilities reach compliance.

d. Total direct labor requirements

The total direct labor requirement for complying with the MP&M rule is the sum of the direct labor requirements of manufacturing, installing, and operating treatment systems. Table 6.2 summarizes the direct labor requirements from compliance expenditures under the regulation. These requirements include total one-time expenditures to manufacture and install compliance equipment equal to 20 FTEs, and continuing requirements for operating and maintenance of 2 FTEs per year.

Table 6.2: Total Direct Labor Requirements of the Final Rule, National Estimates (millions, 2001$, before tax)

	Total Cost	Labor Share	Total Labor Cost	FTEs[a]
One-time compliance cost	***$3.6***		***$1.4***	***20***
Capital equipment manufacturing	$3.1	30.6%	$0.9	14
Installation labor	$0.5	100.0%	$0.5	7
Annual operating and maintenance cost	***$13.1***	***1.0%***	***$0.1***	***2***

[a] Number of jobs calculated on the basis of an average annual labor cost of $69,373 which assumes an average hourly wage of $34.69 and 2,000 hours per labor-year.

Source: U.S. EPA analysis, Bureau of Labor Statistics, Bureau of Economic Analysis.

Table 6.3 summarizes the total direct labor requirements from compliance expenditures under the final rule and alternative regulatory options.

Table 6.3: Total Direct Labor Requirements of the Final Rule and Alternative Regulatory Options

Option	One-time manufacturing and installation of compliance equipment			Annual operating and maintenance
	Manufacturing	Installation labor	Total	
Option I: Selected Option	14	7	20	2
Option II: NODA/Proposed Option	2,467	1,195	3,662	215
Option III: 413 to 433 Upgrade Option	294	142	436	8
Option IV: All to 433 Upgrade Option	457	221	678	13

Source: U.S. EPA analysis, Bureau of Labor Statistics, Bureau of Economic Analysis.

Requirements under the Proposed/NODA Option include total one-time expenditures to manufacture and install compliance equipment equal to 3,662 FTEs, and continuing requirements for operating and maintenance of 215 FTEs per year. EPA expects the 413 to 433 Upgrade Option and the All to 433 Upgrade Option to require 436 and 678 one-time FTEs and 8 and 13 continuing FTEs per year, respectively.

6.3 Net Effects on Employment

The timing and duration of employment changes resulting from the rule or the alternative options depend on the type of employment demands and the condition of the economy at the time those demands occur. The increased employment resulting from facilities' purchase and installation of compliance equipment will be short-term and is expected to occur in the early years of implementation. However, the increased employment needed to operate and maintain compliance systems will persist, presumably for the life of the compliance equipment. For job losses that might accompany the alternative options, the duration of unemployment would depend on labor demand in the economy and specifically in the locations at which facilities close, and the skill level of those individuals becoming unemployed.

Table 6.4 reports the estimated level and timing of direct employment impacts of the final rule. The estimates assume that: (1) facilities come into compliance or close over a three year period, (2) displaced workers are out of work for one year on average, and (3) the requirements to operate and maintain compliance systems continue for 15 years. As shown in Table 6.4, the final rule results in a small increase in employment in all years of the analysis period. Summing employment each year over the 15 year analysis period indicates that the regulation would increase direct labor requirements by 47 "FTE-years", or an average gain of 3 FTEs per year. The comparable estimates for the alternative options (shown in Table 6.5) include the effect of job losses from facility closures.

The industries in which employment changes are expected to occur also depend on the type of employment demands under the rule. Increases in employment for operation and maintenance of compliance equipment are expected to occur in the MP&M industries. In addition, because the MP&M industry, itself, is likely to be a manufacturer of compliance equipment, a material portion of the increase in employment for producing and installing compliance equipment is likely to occur in the MP&M industries. Accordingly, a substantial part of the total employment increase will likely occur in the MP&M industries. Still, on balance, the impact on total employment – both in the economy as a whole and in the MP&M industries – is expected to be very small. The average net gain of 3 FTEs for the final rule equals a negligible percent of total employment in the MP&M facilities potentially subject to the rule and even less compared with total 1996 employment in the industries that make up the larger MP&M industry.[4]

EPA did not consider the possible effects of excess capacity or underemployment in the equipment manufacturing and installation industries, and assumed that all compliance requirements would result in proportional changes in employment.

[4] Total employment in the potentially regulated MP&M facilities is 6,973,352 FTEs, as reported in the Section 308 surveys.

Table 6.4: Estimated Final Rule Net Direct Employment Impacts over 15 Years (number of FTEs per year and total FTE-years)

Year	One-Time Manufacturing & Installation[a]	Annual O&M[a]	Closures	Net Change in Employment
1	7	1	0	7
2	7	1	0	8
3	7	2	0	9
4		2		2
5		2		2
6		2		2
7		2		2
8		2		2
9		2		2
10		2		2
11		2		2
12		2		2
13		2		2
14		2		2
15		2		2
Total FTEs over 15 years	20	26	0	47

[a] Assumes that one-third of facilities come into compliance in each of 3 years.

Source: U.S. EPA analysis.

Table 6.5 presents the estimated direct employment impact of the final rule and the alternative options. As discussed earlier, the final rule would increase direct labor requirements over the 15 year period by an estimated 47 FTEs; however under each of the alternative regulatory options, direct labor requirements would decrease. The total estimated net decrease in direct labor requirements under the NODA/Proposed Option of 26,060 FTEs is driven by the 32,729 job losses from estimated facility closures under the option. The 7,874 job losses from projected facility closures under the 433 Upgrade Options result in a net decrease in direct labor requirements under the 413 to 433 Upgrade Option of 7,319 FTEs and the All to 433 Upgrade Option of 7,011 FTEs.

Table 6.5: Estimated 15 Year Net Employment Effects for the Final Rule and Alternative Regulatory Options

Option	Net Change in Employment (FTEs)
Option I: Selected Option	47
Option II: NODA/Proposed Option	(26,060)
Option III: 413 to 433 Upgrade Option	(7,319)
Option IV: All to 433 Upgrade Option	(7,011)

Source: U.S. EPA Analysis.

GLOSSARY

direct labor requirements: employment losses resulting from lost MP&M output caused by the rule and employment gains caused by compliance expenditures resulting from the rule in the directly-affected industries.

full-time equivalent (FTE): hours of employment equivalent to one full-time job.

FTE-year: one year of full-time employment.

indirect labor requirements: changes in employment in industries that supply directly affected industries resulting from increased purchases or reduced output in the directly affected industries.

induced labor requirements: changes in employment in industries providing goods and services to people whose employment is directly or indirectly affected by the rule.

linked industries: industries that sell goods and services to or purchase output from a directly-affected industry.

ACRONYM

FTE: full-time equivalent

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Chapter 7: Government and Community Impact Analysis

INTRODUCTION

In this chapter, EPA examines how the final MP&M rule and alternatives for regulation considered by EPA might affect the economic welfare of communities, where communities are defined as States, counties and metropolitan areas. Communities may suffer adverse impacts from a rule in two ways. First, local governments may incur costs to comply with the rule, if they operate MP&M facilities, or to administer the rule. Second, communities may be affected if MP&M facility closures resulting from the rule affect the health of their local economies.

This analysis was undertaken in part to meet potential requirements of the ***Unfunded Mandates Reform Act (UMRA)***. However, the final rule does not contain a Federal mandate under UMRA because the rule will not result in expenditures of $100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. Thus, the final rule is not subject to the requirements of the UMRA sections 202 and 205. Although the final rule does not contain a Federal mandate under UMRA, this chapter summarizes the impacts of the final rule on State and local governments as part of its decision-making process.

7.1 IMPACTS ON GOVERNMENTS

The analysis considered two effects on governments:[1]

- Government-owned MP&M facilities may be subject to the regulation, and therefore incur compliance costs; and
- Municipalities that own ***publicly-owned treatment works (POTWs)*** that receive influent from MP&M facilities subject to the rule may incur costs to implement the regulation. These include costs of permitting MP&M facilities that have not been previously permitted, and repermitting some MP&M facilities with existing permits earlier than would otherwise be required.

7.1.1 Impacts on Governments that Operate MP&M Facilities

Chapter 5 presented EPA's analysis of the final rule's impacts on government-owned MP&M facilities and on the governments that own them. The analysis shows that the final rule imposes only limited costs on government-owned facilities, because 3,327 (88 percent) of the 3,785 facilities are not subject to this regulation (121 General Metals facilities and 3,206 Oily Wastes facilities.) Thus, the final rule applies to 458 government owned facilities.

An estimated 162 government-owned facilities (4.3 percent of the total) would incur costs under the final rule exceeding one percent of their baseline cost of service. Therefore, 96.3 percent of the government-owned facilities either incur no costs or are likely to be able to absorb the added costs within their existing budgets. None of the affected governments incur costs that

[1] A third potential cost would be implementation cost for *direct* dischargers. However, all direct dischargers regulated under the final rule (and any alternative options considered) must already have NPDES permits in the baseline. EPA therefore does not expect governments to incur incremental administrative costs as a result of this rule for direct dischargers, because governments will incorporate the new standards into existing NPDES permits.

cause them to exceed the thresholds for impacts on taxpayers or for government debt burden. EPA therefore has concluded that the final rule will not impose budgetary burdens on any of the governments that own MP&M facilities.

7.1.2 POTW Administrative Costs

The selected option excludes all indirect dischargers from MP&M regulation. Therefore, there are no POTW administrative costs associated with the final rule. However, under some of the alternative regulatory options considered, State and local governments would incur implementation costs for indirect dischargers. This section describes the administrative activities involved and presents estimates of their costs.

EPA is able to estimate total costs to POTWs, but is not able to estimate the costs to any one POTW, since it is not possible to determine which POTWs receive discharges from the regulated MP&M facilities. EPA is also not able to assess budgetary impacts on community-owned POTWs, since available data do not provide estimates of financial characteristics for the specific POTWs receiving effluent affected by this rule. The relatively low POTW permitting costs per facility and the potential cost savings estimated in this section, however, suggest that impacts on individual POTWs, if any, would be minor.

a. Permitting activities

The General Pretreatment Regulations (40 CFR Part 403) establish procedures, responsibilities, and requirements for EPA, States, local governments, and industry to control pollutant discharges to POTWs. Under the Pretreatment Regulations, POTWs or approved States implement categorical pretreatment standards (i.e., PSES and PSNS).

Discharges from an MP&M facility to a POTW may already be permitted in the baseline.[2] For example, industrial users subject to another Categorical Pretreatment Standard would have a discharge permit. Other significant industrial users (SIU) that are typically permitted by POTWs include industrial users that:

- discharge an average of 25,000 gallons per day or more of process wastewater to a POTW,
- contribute a process waste stream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant, or
- have a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard.

Since all indirect dischargers have been excluded from the final rule, EPA expects no POTW administrative costs to be associated with the rule. Under the alternative options, which include indirect dischargers, EPA expects no increase in permitting costs for facilities that already hold a permit in the baseline. However, governments will incur additional permitting costs for unpermitted facilities (under the NODA/Proposal option only) and to accelerate repermitting for some indirect dischargers that currently hold permits. On the other hand, some administrative costs might decrease. For example, control authorities would no longer have to repermit facilities that are estimated to close as the result of the regulatory options considered. Communities that own POTWs that must issue permits might therefore experience a change in costs as a result of some of the alternative regulatory options considered.

b. Data sources

EPA collected information from POTWs to support development of the MP&M effluent guideline. Of 150 surveys mailed, EPA received responses to 147, for a 98 percent response rate. The POTW Survey asked respondents to provide information on administrative permitting costs for indirect dischargers, sewage sludge use and disposal costs and practices, and general information (including number of permitted users and number of known MP&M dischargers). The administrative cost information included the number of hours required to complete specific permitting and repermitting, inspection, monitoring, and enforcement activities. Respondents were also asked to provide an average labor cost for all staff involved in permitting activities. EPA used the survey responses on administrative costs to estimate a range of costs incurred by POTWs to permit a single MP&M facility.

EPA also used the data provided in the Association of Metropolitan Sewerage Agencies (AMSA) survey to verify and, in some cases, supplement its own analyses of POTW administrative costs of the final MP&M rule. AMSA provided EPA with

[2] Under the General Pretreatment Program, a facility's discharges may be controlled through a "permit, order or similar means". For simplicity, this report refers to the control mechanism as a permit.

comments on the proposed MP&M rule and supplemented these comments with a spreadsheet database. The database contains data from an AMSA formulated survey and covers responses from 176 POTWs, representing 66 pretreatment programs. The AMSA survey was conducted to verify data from EPA's survey of POTWs and therefore included similar, although fewer, variables compared to EPA's survey. Elements EPA verified using the AMSA survey include: (1) the estimated number of indirect dischargers and (2) the unit costs of certain permitting activities, including permit implementation, sampling, and sample analysis. Elements EPA added to its analysis using the AMSA data include: (1) screening costs for POTWs that do not currently operate under a pretreatment program and (2) management oversight costs associated with implementing the MP&M regulation.

c. Methodology

EPA estimated the annualized costs of permitting indirect dischargers under the different regulatory options using the following steps:

- **Determine the number and characteristics of indirect dischargers that will be permitted under each regulatory option.** Only the NODA/Proposal option includes costs for permitting an MP&M facility for the first time. The final rule does not cover indirect dischargers while the other regulatory options only regulate those indirect dischargers that already hold permits in the baseline. For the NODA/Proposal option, EPA determined how many new permits would be issued. The NODA/Proposal option only requires concentration-based permits, no mass-based permits. In addition, EPA determined the number of facilities that currently hold a permit and that would have to be repermitted sooner than would otherwise be the case.

- **Use the data from the POTW Survey to determine a high, middle, and low hourly burden for permitting a single facility.** EPA defined the low and high estimates of hours such that 90% of the POTW responses fell above the low value and 90% of responses fell below the high value. The median value is used to define the middle hourly burden.

- **Use the data from the POTW Survey to determine the average frequency of performing certain administrative functions.** For administrative functions that are not performed at all facilities, survey data were used to calculate the portion of facilities requiring these functions. For example, the survey data show that on average 38.5% of facilities submit a non-compliance report.

- **Multiply the per-facility burden estimate by the average hourly wage.** EPA determined a high, middle, and low dollar cost of administering the rule for a single facility by multiplying the per-facility hour burden by the average hourly wage. The POTW Survey reported an average hourly labor rate of $39.33 ($2001) for staff involved in permitting. This is a fully-loaded cost, including salaries and fringe benefits.

- **Calculate the annualized cost of administering the rule.** The number of facilities, hourly burden estimate, frequency estimates, and hourly wage estimates are all combined to determine the total cost of administering the rule. The type of administrative activities required varies over time and the total administrative cost is calculated over a 15 year time period. EPA calculated the present value of total costs using a seven percent discount rate, and then annualized the present value using the same seven percent discount rate.

d. Unit costs of permitting activities

EPA estimated unit costs for the following permitting activities:

- ***Permit application and issuance***: developing and issuing concentration-based permits at previously unpermitted facilities; providing technical guidance; and conducting public and evidentiary hearings;

- ***Inspection:*** inspecting facilities both for the initial permit development and to assess subsequent compliance;

- ***Monitoring:*** sampling and analyzing permittee's effluent; reviewing and recording permittee's compliance self-monitoring reports; receiving, processing, and acting on a permittee's non-compliance reports; and reviewing a permittee's compliance schedule report for permittees in compliance and permittees not in compliance;

- ***Enforcement:*** issuing administrative orders and administrative fines; and

- ***Repermitting.***

EPA believes that these functions constitute the bulk of the required administrative activities. To these costs, EPA added a provision for managerial oversight of 25 percent.[3] There are other relatively minor or infrequent administrative functions (e.g., providing technical guidance to permittees in years other than the first year of the permit, or repermitting a facility in significant non-compliance), but their costs are likely to be insignificant compared to the estimated costs for the five major categories outlined above. EPA also added a cost for identifying facilities to be permitted for POTWs that do not currently operate under a Pretreatment Program. EPA estimates this cost to be approximately $0.8 million. This cost only applies to the NODA/Proposal Option since facilities subject to the upgrade options already hold permits.

Table 7.1 provides a summary of the estimated unit costs for each permitting activity. Appendix F provides a detailed discussion of these unit costs.

Table 7.1: Government Administrative Activities for Indirect Dischargers: Per Facility Hours and Costs

Administrative Activity	Percent of facilities for which activity is required	Frequency of activity	Typical hours and costs (2001$)		
			Low	Median	High
Develop and issue a concentration-based permit at a previously unpermitted facility	100% of unpermitted facilities (applicable to NODA/Proposal option only)	One time	4.0 hours; $122	10.0 hours; $304	40.0 hours; $1,217
Develop and issue a mass-based permit at a previously unpermitted facility	100% of MP&M facilities being issued a new mass-based permit (estimates used for the proposed rule)	One time	4.0 hours; $122	13.0 hours; $396	40.0 hours; $1,217
Develop and issue a mass-based permit at a facility holding a concentration-based permit	100% of MP&M facilities with permit conversion (estimates used for the proposed rule)	One time	2.0 hours; $61	8.0 hours; $243	20.0 hours; $608 year
Provide technical guidance to a permittee on permit compliance	100% of MP&M facilities being issued a new concentration-based permit (applicable to NODA/Proposal option only)	One time	1.5 hour; $46	4.0 hours; $122	12.0 hours; $365
	100% of MP&M facilities being issued a new mass-based permit (estimates used for the proposed rule)	One time	2.0 hours; $61	4.0 hours; $122	12.0 hours; $365
Conduct a public or evidentiary hearing	3.2% of MP&M facilities being issued a new mass-based or concentration-based permit (applicable to NODA/Proposal option only)	One time	2.0 hours; $61	8.0 hours; $243	40.0 hours; $1,217
Inspect facility for permit development	100% of MP&M facilities being issued a new permit (applicable to NODA/Proposal option only)	One Time	2.2 hours; $66	5.0 hours; $152	12.0 hours; $365
Inspect facility for compliance assessment	100% of MP&M facilities being issued a new permit (applicable to NODA/Proposal option only)	Annual	2.0 hours; $61	3.3 hours; $101	10.0 hours; $304
Sample and analyze permittee's effluent	100% of MP&M facilities being issued a new permit (applicable to NODA/Proposal option only)	Annual	1.0 hour; $30	3.0 hours; $91	17.7 hours; $537

[3] The 25 percent oversight cost provision is based on comments and data received from the Association of Metropolitan Sewerage Agencies (AMSA).

Table 7.1: Government Administrative Activities for Indirect Dischargers: Per Facility Hours and Costs

Administrative Activity	Percent of facilities for which activity is required	Frequency of activity	Typical hours and costs (2001$)		
			Low	Median	High
Review and enter data from permittee's compliance self-monitoring reports	100% of MP&M facilities being issued a new permit (applicable to NODA/Proposal option only)	2 reports per year	0.5 hours; $15	1.0 hour; $30	4.0 hours; $122
Receive, process and act on a permittee's non-compliance reports	38.5% of all indirect dischargers receiving a new permit (applicable to NODA/Proposal option only)	5 times per year	1.0 hour; $30	2.0 hours; $61	6.0 hours; $183
Review a compliance schedule report	Meeting milestones: 16.0% of all facilities issued a new permit – 94% of the 17% who have compliance milestones (applicable to NODA/Proposal option only)	2 reports per year	0.5 hours; $15	1.0 hour; $30	2.7 hours; $81
	Not meeting milestones: 1% of all facilities issued a new permit – 6% of the 17% who have compliance milestones (applicable to NODA/Proposal option only)	2 reports per year	1.0 hours; $30	2.0 hours; $61	6.0 hours; $183
Minor enforcement action e.g., issue an administrative order	7% of MP&M facilities being issued a new permit (applicable to NODA/Proposal option only)	Annual	1.0 hour; $30	3.7 hours; $112	12.0 hours; $365
Minor enforcement action, e.g., impose an administrative fine	7% of MP&M facilities being issued a new permit (applicable to NODA/Proposal option only)	Annual	1.0 hour; $30	5.0 hours; $152	24.0 hours; $730
Repermit	100% of MP&M facilities being issued a new permit (applicable to NODA/Proposal option only)	Every 5 years	1.0 hour; $30	4.0 hours; $122	20.0 hours; $608

Source: U.S. EPA analysis of POTW Survey responses.

e. Results

Table 7.2 summarizes the number of facilities permitted and the estimated POTW permitting costs for the final rule and the alternative options considered. Appendix F presents detailed calculations of permitting costs for these regulatory options.

The results presented in Table 7.2 reflect three effects of the regulatory options on the cost of permitting indirect dischargers: (1) incremental costs from permitting currently unpermitted facilities that require a new permit for the first time (NODA/Proposal option only); (2) incremental costs from repermitting some facilities that currently hold a permit earlier than would otherwise be the case (within three years rather than within five years); and (3) cost savings from facilities that close as a result of the regulation and no longer require repermitting.

The first part of the table shows the incremental *number of facilities* requiring a new permit, requiring early repermitting, or estimated to close as a result of the rule. The second part of the table presents the resulting change in *permitting costs*. Costs are calculated by multiplying the incremental number of facilities in each year by the unit hours and cost per facility for those activities. All facilities are assumed to receive a permit within a three-year compliance period. Some facilities with existing permits are repermitted sooner than they otherwise would be on the normal five-year permitting cycle. The cost analysis calculates incremental costs by subtracting the costs of repermitting these facilities on a five-year schedule from the costs of repermitting all such facilities within three years. EPA assumes that the required initial permitting activities will be equally divided over the three-year period. The analysis also calculates the net change in the number of facilities requiring permitting by subtracting the number of facilities that close due to the rule from the number of facilities that will require new permits under each regulatory option.

Table 7.2: POTW Permitting Costs by Regulatory Option

	I: Selected Option	II: NODA/Proposal Option	III: Directs + 413 to 433 Upgrade	IV: Directs + 413+50%LL Upgrade
Number of facilities permitted:				
New concentration-based permit	n/a	103	0	0
New mass-based permit[a]	n/a	0	0	0
Conversion of existing concentration-based to a mass-based permit[a]	n/a	0	0	0
Repermitted within 3 rather than 5 years	n/a	1,434	382	566
Regulatory closures (no longer requiring permits)[b]	n/a	722	120	120
POTW permitting costs over 15 years (2001$):				
Net present value				
Low	n/a	($422,000)	($238,000)	($236,000)
Medium		($1,802,000)	($509,000)	($501,000)
High		($9,357,000)	($1,982,000)	($1,940,000)
Annualized (at 7%)				
Low	n/a	($46,000)	($26,000)	($26,000)
Medium		($198,000)	($56,000)	($55,000)
High		($1,027,000)	($218,000)	($213,000)
Maximum costs in any one year				
Low	n/a	$1,023,000	($6,000)	($3,000)
Medium		$1,022,000	($4,000)	$6,000
High		$991,000	$1,000	$48,000

[a] EPA does not require mass-based permits under any of the option considered for the final rule.
[b] Some facilities with existing permits will no longer require permitting due to regulatory closures.

Source: U.S. EPA analysis.

Because indirect dischargers were excluded from the final regulation, EPA expects no additional POTW administrative costs from the final rule. Each of the three alternative regulatory options considered would result in *reduced* POTW regulatory costs. These cost savings result from regulatory closures (i.e., facilities that currently hold a permit and would have required repermitting in the baseline, but that will no longer require repermitting under the regulatory options). The cost savings as a result of regulatory closures outweigh the additional costs associated with issuing new permits (under the NODA/Proposal option only) and repermitting on an accelerated, three-year schedule. Estimated annualized cost savings to POTWs for the three alternative regulatory options range between $0.04 and $1.0 million under the NODA/Proposal option, and between $0.03 and $0.2 million under the Directs + 413 to 433 Upgrade option and the Directs + 413+50%LL Upgrade option (all costs in ($2001).

7.2 Community Impacts of Facility Closures

EPA considered the potential for adverse impact of regulation-induced changes in employment on communities where MP&M facilities are located. Because EPA anticipates no facility closures and associated employment losses from the final regulation, EPA expects no employment-related impacts on communities in which MP&M facilities operate. See Chapter 6 for further discussion of potential employment effects.

GLOSSARY

publicly-owned treatment works (POTW): a treatment works as defined by section 212 of the Clean Water Act, which is owned by a State or municipality. This definition includes any devices or systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature. (http://www.epa.gov/owm/permits/pretreat/final99.pdf)

Unfunded Mandates Reform Act (UMRA): Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104-4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and Tribal governments and the private sector. Under §202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures to State, local, and Tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, §205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule.

ACRONYMS

POTW: publicly-owned treatment works

UMRA: Unfunded Mandates Reform Act

Chapter 8: Foreign Trade Impacts

Introduction

EPA assessed the likely impacts on foreign trade as a result of the final rule and the alternatives considered for regulation as part of the analysis of the rule's effect on the national economy. Changes in the balance of trade have the potential to affect currency exchange rates, money supply, interest rates, inflation, capital flows and labor migration. The MP&M industry sectors include a substantial portion of the nation's economy, and significant impacts on the balance of trade in these industries could affect the overall economy.

As part of the facility impact analysis in Chapter 5, EPA assessed potential price increases and output losses that may result from the rule. EPA assessed the impact of these market-level changes on the U.S. balance of trade using information provided by MP&M private facility surveys on the source of competition in domestic and foreign markets. The trade analysis allocates the value of changes in output for each facility that is projected to close due to the rule to exports, imports or domestic sales, based on the predominant source of competition in each market reported in the surveys.

EPA's analysis predicts no foreign trade impacts as a result of the final rule because no facility closures are expected. This analysis does not account for factors such as price increases from the rule or the response of foreign producers to the rule, but EPA believes that these factors will have a negligible effect on the U.S. balance of trade. This chapter analyzes the impact on foreign trade of the alternative regulatory options for which closures are predicted.

8.1 Data Sources

The assessment of foreign trade impacts is based on the facility closure analysis in Chapter 5. The revenue from any closing facilities is assumed to be lost output attributable to the rule.

The analysis uses survey responses to determine whether a closed facility's revenues are more likely to be replaced by either domestic or foreign producers. Question 5 in the Phase I §308 survey asked respondents to identify their "major source of competition" in each of three markets: local/regional, national, and international. Question 8 in the Phase II survey asked respondents to identify their "most significant source of competition" in domestic and international markets. Respondents selected one of the following possible responses:

- domestic firms,
- foreign firms,
- no competition in this market, and
- do not operate in this market.

During the process of clarifying survey answers with respondents, EPA found that most respondents who did not select any of the sources of competition said that they did not participate in the relevant market. Therefore, if a respondent did not answer the question regarding the most important source of competition in the domestic or international markets, EPA classified the facility as not operating in the respective market (domestic or foreign).

The analysis also uses survey responses to determine revenues from exports. The Phase I §308 survey reported the percentage of revenues earned from domestic customers and from overseas markets. EPA used export share and total revenues for each facility to calculate export and domestic revenues. The Phase II survey asked respondents to report

revenues from MP&M exports. EPA then calculated domestic sales by subtracting export revenues from total revenues for each facility.

The Iron & Steel survey did not report comparable information on the source of competition in domestic and foreign markets. EPA relied on published trade statistics for the products produced by facilities in the Steel Forming & Finishing subcategory to assess potential impacts on trade for these facilities.

EPA obtained 1996 import and export data from the Bureau of the Census, Foreign Trade Division for those commodities determined to be MP&M-related. The data included imports and exports by all facilities in relevant industries, including both dischargers and non-dischargers.

8.2 METHODOLOGY

The effect of an increase in domestic production costs on the foreign trade balance is influenced by a variety of factors, including:

- the extent to which domestic producers attempt to raise prices to recover costs,
- the price elasticity of demand in both domestic and export markets,
- the likely pricing and supply response of foreign producers, and
- trends in currency exchange rates.

EPA did not attempt to simultaneously model changes in prices, output, and sales in domestic and foreign markets for the products and services produced by the MP&M industry sectors. As in the facility impact analysis described in Chapter 5, the trade analysis relies on a sequential analysis that assesses price increases and then predicts output adjustments based on closures. EPA used facilities' own assessments of their competitive status relative to foreign producers, as reported in the survey, to assess impacts of these output adjustments on the balance of trade.

EPA expects that foreign firms would replace some but not all of the output from any closing facilities. Domestic firms that remain open or enter the market might also win customers that used to buy from the closing facility. Revenues lost by closing facilities are assigned to domestic or foreign producers as follows:

- ***Lost exports:*** If a closing facility stated that most of its international competition came from foreign firms, then EPA assigned the facility's export revenues to foreign firms. U.S. exports would therefore decline by the amount of the closing facility's exports. If the facility identified domestic businesses as its greatest source of competition in foreign markets, then EPA assigned the closing facility's export revenues to other domestic firms. Closures of these facilities, which reported relatively low foreign competition for exports, will have no impact on U.S. exports under the expected scenario.
- ***Increased imports:*** If a closing facility identified foreign producers as the main source of domestic sector competition, then EPA assigned the facility's lost domestic revenues to foreign firms. Imports would increase by the same amount. If other domestic businesses posed the strongest competition, then EPA assigned the closing facility's domestic sales to other U.S. producers, and imports would remain constant.

The survey data collected for the Steel Forming and Finishing facilities did not provide export data. EPA assumed that the ratio of exports to value of shipments for any closing facilities in the analysis was the same as the ratio for the industry as a whole.

From the estimated changes in exports and imports, EPA calculated the net trade impact (reduction in exports *plus* increase in imports) and compared this value to baseline trade levels for (1) all commodities and (2) MP&M sector commodities, only.

8.3 RESULTS

Chapter 3 provides an overview of exports, imports and the balance of trade in the MP&M industry sectors. U.S. MP&M producers as a group exported products with a value of $345 billion in 1996. Imports to the U.S. of the same products in 1996 totaled $421 billion, resulting in an overall net MP&M commodity trade deficit of $76 billion. Some MP&M sectors contribute to a positive commodity trade balance (e.g. aircraft, with a $27 billion positive balance in 1996). In other sectors, substantially more products are imported than exported (e.g. motor vehicles, with a net negative balance of $63 billion.)

Table 8.1, below, summarizes the estimated impact of the final rule and alternative options on the U.S. balance of trade for all commodities. Because EPA's analysis indicates that the final rule will cause no facility closures, EPA expects that the final regulation will not affect the balance of trade. As shown in the table, the other regulatory options would have a negligible impact on U.S. imports, exports, and the national trade balance. Option II (NODA option) results in the most closures and thus the largest trade impacts. However, even in this option, projected imports increase by only $85 million, or slightly more than one hundredth of one percent of baseline imports, and exports decrease by only $55 million, less than one hundredth of one percent of baseline exports. The net result for the NODA option is an insignificant 0.08 percent decline in the national balance of trade.

Table 8.1: Estimated National Impacts on Total U.S. Foreign Trade (millions, 2001$)

	1996 Exports	1996 Imports	Trade Balance[a]
Baseline	**$666,321**	**$847,767**	**($181,446)**
Option I: Selected Option			
Change due to the rule[b]	n/a	n/a	n/a
Option II: Proposed/NODA Option			
Change due to the rule	($55)	$85	($141)
Post-compliance	$666,266	$847,852	($181,587)
% Change from baseline	-0.008%	0.010%	0.078%
Option III: 413 to 433 Upgrade Option			
Change due to the rule	$0	$22	($22)
Post-compliance	$666,321	$847,789	($181,468)
% Change from baseline	0%	0.0026%	0.012%
Option IV: All to 433 Upgrade Option			
Change due to the rule	$0	$22	($22)
Post-compliance	$666,321	$847,789	($181,468)
% Change from baseline	0%	0.0026%	0.012%

[a] Trade balance is equal to exports minus imports.
[b] There were no regulatory closures in the selected option, and so this analysis predicts no foreign trade impacts.

Source: Bureau of Census and U.S. EPA analysis.

Table 8.2 shows regulatory impacts on foreign trade in MP&M industry commodities. As noted above, EPA estimates that the final rule will cause no closures and thus have no foreign trade impacts. In the other options, the projected changes in exports and imports represent only an insignificant percentage of commodity trade in the MP&M industry sectors. The

largest impacts occur in Option II (NODA Option), but even these impacts result in only a 0.2 percent decline in the net trade balance in these industries.

Table 8.2: Estimated National Impacts on MP&M-Related Foreign Trade (millions, 2001$)

	1996 Exports	1996 Imports	Trade Balance[a]
Baseline	**$345,274**	**$421,015**	**($75,741)**
Option I: Selected Option			
Change due to the rule[b]	n/a	n/a	n/a
Option II: Proposed/NODA Option			
Change due to the rule	($55)	$85	($141)
Post-compliance	$345,219	$421,100	($75,882)
% Change from baseline	-0.016%	0.020%	0.186%
Option III: 413 to 433 Upgrade Option			
Change due to the rule	$0	$22	($22)
Post-compliance	$345,274	$421,037	($75,763)
% Change from baseline	0%	0.005%	0.030%
Option IV: All to 433 Upgrade Option			
Change due to the rule	$0	$22	($22)
Post-compliance	$345,274	$421,037	($75,763)
% Change from baseline	0%	0.005%	0.030%

[a] Trade balance is equal to exports minus imports.
[b] There were no regulatory closures in the selected option, and so this analysis predicts no foreign trade impacts.

Source: Bureau of Census and U.S. EPA analysis.

The analysis of trade impacts does not explicitly account for responses to price increases caused by the rule, as noted previously. However, EPA expects little change in exports and imports as a result of the minimal price increases predicted for the final rule. The estimated price increases are less than one half of one percent in all sectors (see Table 5.4 in Chapter 5). Annual rates of inflation for the United States' major trading partners are generally well above the projected increases in MP&M prices, and price increases in the projected range are not likely to materially affect the terms of U.S. trade in MP&M products.[1]

[1] The following are 1990-98 annual inflation rates, as measured by the GDP implicit deflator, for nine of the U.S.' s top ten trading partners: Canada 1.4%, Mexico 19.5%, Japan 0.2%, China 9.7%, Germany 2.2%, United Kingdom 3.0%, Republic of Korea 6.4%, France 1.7%, and Singapore 2.1%. The annual change in the U.S. GDP deflator over the same period is 1.9% (Data were not reported for Taiwan.) World Bank, *2000 World Development Indicators*, Table 4.16.

REFERENCES

U.S. Department of Commerce, Bureau of the Census. 1997. *Current Industrial Reports:* Steel Mill Products.

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Chapter 9: Firm Level, New Source, and Industry Impacts

INTRODUCTION

The previous chapters assessed impacts on MP&M facilities, on governments and communities, and on the U.S. balance of trade. This chapter considers impacts on private businesses in more detail, by addressing three categories of impacts. First, the analysis of impacts on firms builds on the facility impact analysis to assess whether firms that own multiple facilities are likely to incur more significant impacts than indicated by the facility impact analysis. Second, the ***new source*** facility impact analysis considers whether the final rule might impose disproportionate burdens on new sources relative to existing sources, and thereby pose a barrier to new entry. Third, this chapter discusses potential industry-level impacts of the final rule.

CHAPTER CONTENTS

9.1 FIRM LEVEL IMPACTS

EPA analyzed economic impacts on firms for the following reasons:

- Impacts may be more significant at the firm level than at the facility level if a firm owns a number of facilities that incur significant costs. To the extent allowed by the available data, the analysis therefore looks at the combined effect of the facility compliance costs for all facilities owned by a given firm.

- A firm-level analysis is needed to assess impacts on small businesses, as required by the Regulatory Flexibility Act and SBREFA. Certain findings from the firm-level analysis are used in the small business impact analysis presented in the following Chapter 10.

9.1.1 Sources

The firm-level analysis begins from the results of the facility-level analysis presented in Chapter 5, supplemented by firm-level information provided by the MP&M facility surveys and publically available information.

EPA was not able to conduct a rigorous national analysis of firm-level impacts because the sample frame used to provide national estimates from surveyed facilities reflects the population of facilities rather than firms. EPA therefore analyzed impacts for a hybrid dataset of MP&M firms that includes both national estimates (for single-facility firms) and sample firms (for multiple-facility firms), The Agency believes that the analysis of firm-level impacts presented in this chapter provides a useful indication of national firm-level impacts, however, for two reasons:

- Most MP&M facilities are single-facility firms. The survey facility sample weights can be used to extrapolate to the national number of firms for these single-site firms.

- EPA requested voluntary information in the Phase II detailed questionnaires on other MP&M facilities owned by the firms responding to the survey for a sampled facility. EPA aggregated multiple-facility compliance costs to the firm-level by including costs for all surveyed facilities and, for the Phase II survey, facilities identified in voluntary responses.

It is unlikely that firm-level impacts would be material among all MP&M firms in the nation, if this partial analysis does not indicate significant impacts among the firms identified in this analysis.

9.1.2 Methodology

The various surveys asked respondents to provide firm-level revenues for the parent firm. For single-facility firms, firm revenue and compliance costs are identical to those for the facility. For firms that own more than one sample facility, compliance costs are the sum of costs for all facilities reported on in the survey.

In Part V of the detailed Phase II questionnaire, respondents had the option to submit additional voluntary data for other MP&M facilities owned by the same parent firm. EPA did not perform a detailed engineering analysis to develop detailed estimates of compliance costs for these facilities; however, EPA used the detailed estimates of compliance costs to estimate costs for these additional facilities. EPA assumed that these additional facilities would have the same average compliance costs as facilities in the same subcategory, flow range, and discharge type for which detailed cost estimates were developed.

EPA then grouped together all facilities with a common parent firm from the Phase I, Phase II and Iron and Steel surveys. For each firm in the analysis, firm-level compliance cost is:

$$CC_{firm} = \sum_{i} CC_i \qquad (9.1)$$

where:

CC_{firm} = firm-level compliance cost
CC_i = compliance cost for surveyed facility *i* owned by the firm

Firm-level compliance costs were compared to firm revenues. EPA judged that firms with compliance costs less than one percent of revenues would not be materially affected by the regulation. EPA identified firms as subject to potentially more serious impacts if their compliance costs exceeded three percent of revenues.

All firm-level data were inflated to 2001 dollars using the ***Producer Price Index (PPI)***, as described in Chapter 5.

9.1.3 Results

As noted in the introduction, the Agency was not able to estimate the national numbers of firms that own MP&M facilities precisely, because the sample weights based on the survey design represent numbers of facilities rather than firms. EPA assumed that the national facilities that are represented by the 307 sample single-site firms that remain open in the baseline are also all single-site firms. Based on this assumption, EPA estimated that 26,472 of 36,480 (or 73 percent) of private MP&M facilities nationwide are single-facility firms.

In addition, from the survey responses, EPA identified 389 sample facilities that are owned by 276 multi-facility firms. It is not known how many multi-facility firms exist at the national level, so EPA included these 276 firms in the firm-level analysis without extrapolation to the national level.

The combined set of 26,748 firms (26,472 national-level single-facility firms plus 276 sample multi-facility firms) provided the basis for the firm-level analysis. This total does not represent a valid national total for the number of affected MP&M firms. Nonetheless, this analysis provides a reasonable indication of likely firm-level impacts, given the large number of single-facility firms and the use of Part V facility data to supplement the sample facility data for multi-facility firms.

Table 9.1 presents the number of firms in the firm-level analysis. Of the 26,472 facilities that are single-facility firms, 25,297 are owned by potentially small firms. Of the 276 firms that own more than one sample facility, 85 are potentially small firms.

Table 9.1: Number of Privately Owned Facilities and Firms by Firm Type and Size[a]

	Total Firms	Owned by a small firm	Owned by a large firm
National number of single-facility firms (304 unique sample firms)	26,472	25,297	1,175
Sample multi-facility firms	276	85	191
Number of firms in the firm-level analysis	26,748	25,382	1,366

[a] Excludes firms whose only facilities close in the baseline.

Source: U.S. EPA analysis.

Table 9.2 presents estimated firm-level impacts of the MP&M rule. None of the firms in the analysis incur after-tax compliance costs greater than 1 percent of annual revenues. Of the 1,027 firms that incur any costs at all, none close or incur moderate impacts as a result of the rule.

Table 9.2: Firm-level After-Tax Annual Compliance Costs as a Percent of Annual Revenues

Firm Type	Number of Firms in the Analysis[a]	Number and Percent with After-Tax Annual Compliance Costs/Annual Revenues Equal to:					
		0% (no costs)		Between 0% and 1%		>1%	
		Number	%	Number	%	Number	%
Single-site	26,472	25,453	96.2%	1,019	3.8%	0	0.0%
Multi-site	276	269	97.5%	8	2.9%	0	0.0%
Total	26,748	25,722	96.2%	1,027	3.8%	0	0.0%

[a] Single-site firms whose only MP&M facilities close in the baseline are excluded. To be conservative, EPA included compliance costs for facilities that are owned by multi-site firms but predicted to be baseline closures in the facility impact analysis.

Source: U.S. EPA analysis.

This analysis is likely to overstate costs at the firm level because it does not consider the actions a multi-facility firm might take to reduce its compliance costs under the final rule. These include transferring functions among facilities to consolidate wet processes and take advantage of scale economies in wastewater treatment.

9.2 New Source Impacts

This section assesses the impacts of ***New Source Performance Standards (NSPS)*** and ***Pretreatment Standards for New Sources (PSNS)*** limitations on new direct and indirect MP&M dischargers. EPA examines the impact of these regulations on new dischargers to determine whether new source limitations may pose sufficient financial burden on new facilities to constitute a material barrier to entry of new establishments into the MP&M industry sectors. The first section summarizes the framework for assessing new source impacts and the second section reviews the findings from our analysis.

Disproportionate regulatory burdens for new sources could cause adverse industry-level outcomes in the long-run in several ways:

- Imposing more significant costs on new facilities can make existing sources more competitive than new sources, causing barriers to new entry.

- Barriers to entry may increase the market power of existing firms and could discourage competition over time, with resulting losses in market efficiencies.

- Creating a competitive advantage for existing facilities may hinder technological innovation, with resulting losses in productivity.

9.2.1 Methodology

EPA used the existing facility database, sample-weighted, as the basis for the new source analysis. This assumes that future entrants to the industry will look the same as indicated by the sample of facilities in the existing facility database.

To assess the potential impact of new source limitations, EPA assessed compliance costs for two cases: (1) the capital and operating cost of compliance systems for a new facility built in compliance with existing new source discharge limits ("current limits"), and (2) the capital and operating cost of compliance systems for a new facility built in compliance with discharge limits under consideration ("revised limits"), which would be more stringent than the current new source limits. The estimated capital costs for these cases account for the lower cost of a new-construction installation compared to retrofit construction at existing facilities. These compliance cost estimates are described in detail in the *Technical Development Document*. For analyzing the additional cost burden of meeting new limits, EPA calculated the incremental cost of compliance as the cost of meeting the revised limits less the cost of meeting current limits.

As noted above, EPA based its analysis of new source limits on the economic and financial information for the sample of facilities in the existing facility database. The new source analysis excludes sample facilities that are projected to close or to experience moderate economic impacts in the baseline, since the economic characteristics of these financially-weak facilities are unlikely to be representative of new facilities. In addition, EPA excluded some sample facilities from the analysis because of issues in the engineering estimation of compliance costs.

The analysis assumes that new sources would benefit from price increases resulting from the final rule for existing sources in the same way as existing sources. EPA therefore increased the average baseline revenue for new facilities by the average percentage price increase estimated for existing facilities in each subcategory/discharge category, to calculate post-regulation revenues for new sources. This effect of this adjustment on new facility revenue is minor.

To test of financial burden of revised limits and whether this burden might pose a material barrier to entry for new establishments, EPA compared the incremental total annualized cost, after-tax, with facility revenue (cost-to-revenue ratio). EPA classified the results in ranges as follows, fraction of sample-weighted facilities with cost-to-revenue ratio of less than one percent, one to three percent, three to five percent, and greater than five percent.

Table 9.3 shows the total number of privately owned MP&M facilities in the survey sample, the number of existing facilities excluded from the new source analysis, and the number of existing facilities used in this analysis.

Table 9.3: Number of Existing Facilities Used in New Source Analysis

Subcategory	Discharger Type	Total Number of Private MP&M Facilities[a]	Number of Existing Facilities Excluded from New Source Analysis[b]	Number of Existing Facilities Included in New Source Analysis
General Metals	Direct	888	181	707
	Indirect	10,419	1,824	8,594
MF Job Shop	Direct	12	0	12
	Indirect	1,530	165	1,365
Non-Chromium Anodizer	Direct[c]	122	29	93
Oily Wastes	Direct	2,108	936	1,172
	Indirect	23,292	6,148	17,144
Printed Wiring Boards	Direct	8	0	8
	Indirect	840	288	552
Railroad Rebuilders	Direct	6	0	6
Shipbuilding Dry Dock	Direct	6	0	6
All Subcategories		**39,230**	**9,571**	**29,659**

[a] EPA did not estimate new source impacts for municipal operations because "barrier to entry" is not a relevant consideration.
[b] EPA excluded an existing facility from the new source analysis either because it was financially weak in the baseline or because the engineers were unable to accurately estimate compliance costs.
[c] For the analysis of new source limit impacts on the *direct discharge* Non-Chromium Anodizer category, EPA used sample facility information for *indirect dischargers*. The final sample facility database contained no observations for direct dischargers.

Source: U.S. EPA analysis.

9.2.2 Results

Table 9.4 summarizes (1) the currently applicable discharge limit or technology option for new sources in each subcategory and discharge status, and (2) the alternative discharge limits or technology option that EPA considered in assessing whether revised new source discharge limits would constitute a barrier to entry. See Preamble Section VI and the Technical Development Document for discussion of the specific discharge limits and technology options that EPA considered for revised new source discharge limits.

Table 9.4: Current New Source Requirements and Potential Revised New Source Requirements

Subcategory	Discharge Type	Current New Source Requirements	Revised New Source Requirements
General Metals	Direct	40 CFR 433	"Modified" Option 2, (Two-Stage Precipitation)
	Indirect	40 CFR 433	Option 2
MF Job Shops	Direct	40 CFR 433	"Modified" Option 2, (Two-Stage Precipitation)
	Indirect	40 CFR 433	Option 2
Non-Chromium Anodizer	Direct	40 CFR 433	Option 2
Oily Waste	Direct	Estimated existing baseline	Option 6
	Indirect	Estimated existing baseline	Option 6
Printed Wiring Boards	Direct	40 CFR 433	Option 2
	Indirect	40 CFR 433	Option 2
Railroad Rebuilders	Direct	Option 6	Option 10
Shipbuilding Dry Dock	Direct	Option 10	Option 8

Source: U.S. EPA analysis.

Table 9.5 reports the estimated percentages of new facilities incurring cost-to-revenue impacts of: (1) less than one percent, (2) one to three percent, (3) three to five percent, and (4) greater than five percent. As discussed earlier, these estimates are based on estimated incremental new source compliance costs compared to revenues for existing facilities in the MP&M survey universe.

From this analysis, EPA found that revised new source limits would create a barrier to entry for direct discharging facilities in the General Metals, Metal Finishing Job Shops, and Non-Chromium Anodizer subcategories and indirect discharging facilities in the General Metals, Metal Finishing Job Shops, Printed Wiring Board, and Oily Wastes subcategories. On the basis of this finding, EPA decided against issuing revised new source discharge limits for these subcategories. The new source analysis indicated that revised new source limits would *not* create a barrier to entry for direct discharging facilities in the Oily Wastes, Printed Wiring Board, and Railroad Rebuilders subcategories. This finding supported EPA's decision to promulgate new source limits for the Oily Wastes direct discharger subcategory. Although the economic analysis did not indicate a barrier to entry for the Printed Wiring Board and Railroad Rebuilders direct dischargers subcategories, EPA decided against issuing new source limits for these subcategories based on other technical considerations as discussed in Preamble Section VI.

Table 9.5: Estimated Percentages of New Facilities by Cost-to-Revenue Impact Ranges

Subcategory	Discharger Type	After-Tax Compliance Costs as a Percent of Revenue			
		< 1%	1-3%	3-5%	>5%
General Metals	Direct	62%	14%	22%	2%
	Indirect	65%	14%	20%	1%
MF Job Shop	Direct	0%	0%	0%	100%
	Indirect	80%	9%	5%	6%
Non-Chromium Anodizer	Direct	25%	0%	26%	49%
Oily Wastes	Direct	97%	3%	0%	0%
	Indirect	95%	1%	5%	0%
Printed Wiring Boards	Direct	100%	0%	0%	0%
	Indirect	92%	3%	0%	5%
Railroad Rebuilders	Direct	100%	0%	0%	0%
Shipbuilding Dry Dock	Direct	100%	0%	0%	0%

Source: U.S. EPA analysis.

9.3 Industry Level Impacts

Potential industry-level impacts include price increases, reduced competitiveness within the domestic industry and in world markets, and reduced rates of innovation. EPA did not perform a sector-specific analysis for several reasons:

- Sector-level impacts are complicated by the large number of product and service markets included in the MP&M category (e.g., over 200 SICs and three activities – manufacturing, rebuilding, and repair).
- Revenue and cost information is not available on a product by product basis, so it is impossible to link price increases to individual products. and
- Many MP&M facilities derive revenue from multiple industry sectors.

EPA's analysis of facility- and firm-level impacts suggests, however, that material industry-level impacts are unlikely in any of the affected sectors.

The Agency does not expect any industry level impacts from the MP&M regulation because of: (1) the low number of facilities that will have costs, (2) the absence of regulatory closures, and (3) the absence of moderate impacts. Of the estimated 89,000 facilities performing MP&M activities, slightly over half, or about 45,000, do not discharge water and thus will not be affected by the rule. An additional 3,593 discharge water but are expected to close in the baseline. Of the remaining 40,265 facilities that do discharge water and remain open in the baseline, EPA estimates that only 1,380 will incur costs under the final rule. That so few MP&M industry facilities incur costs results from the rule's subcategory exclusions and low-flow cutoffs.

As discussed in Chapter 5, EPA estimates that no facilities will close or incur moderate impacts as a result of the final regulation. Given no regulatory closures or moderate impacts, EPA concludes that the final rule is unlikely to impose significant costs on a substantial number of facilities in the MP&M industry as a whole or at the subcategory level.

Chapter 5 also presented information on the prices increases predicted to occur in each industry sector due to the final rule. Table 5.4 in Chapter 5 presented EPA's estimates of price increases by sector. Projected price increases are less than one half

of one percent for all sectors. Price increases of these magnitudes are unlikely to impose burdens on customers of the regulated facilities or substantially affect MP&M producers' position relative to competitive products (e.g., products made with plastics) or foreign producers. Price increases may affect only some components of a product. In these cases, prices to end-users would rise even less than the amounts detailed in Chapter 5.

EPA does not expect the final rule to affect the rate of technological innovation in the MP&M industry. Innovation impacts could result if the rule discouraged new entry, contributed to increased concentration in the affected industries, or specified the use of particular technologies. The following factors suggest that these conditions do not apply for the final rule:

- EPA's analysis of new source impacts presented in the previous section suggests that the final rule will not affect entry of new businesses in the regulated sectors. The final rule will increase the investment required to build a new facility somewhat. However, the increased capital costs are generally small relative to the overall financial resources of the MP&M facilities, as indicated by the results of the facility impact analysis. In addition, the low flow cutoffs applicable to a large number of MP&M facilities reduce the potential impacts of large capital requirements on small facilities.

- Given the small fraction of facilities regulated in each sector, and absence of closures of moderate impacts for the final regulation, EPA does not expect the rule to increase concentration in any of the MP&M sectors.

- The rule does not require the use of specific production or pollution control processes or technologies. Rather, it specifies a performance standard, based on levels of pollutants in wastewaters that have been shown to be achievable by available technologies. Facilities have the flexibility to achieve these limitations using a variety of approaches, which is likely to encourage rather than discourage innovation in production and pollution control processes.

The final rule may affect the relative competitive position of different firms and facilities in those sectors that incur costs. Facilities that may benefit from the rule include those that: (1) do not discharge wastewater, (2) are eligible for the subcategory exclusions and low-flow cutoffs, (3) already have treatment in place, or (4) can more easily make process changes to reduce pollutant loads.

Facilities that have little or no treatment in place and that discharge substantial pollutant loads may become less competitive. The final rule may level the competitive playing field for facilities that have taken steps to reduce their environmental impacts, relative to facilities that have avoided investments to reduce or eliminate pollutant discharges. EPA views these effects as beneficial, given that the final regulation does not have significant impacts on the industry as a whole, and as long as the rule does not disproportionately impact small entities as a group (impacts on small entities are addressed in the next chapter).

GLOSSARY

new source: Any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced after promulgation of standards of performance under Section 306 of the Clean Water Act which are applicable to such source; and which (1) is constructed at a site at which no other source is located; (2) totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or (3) consists of processes that are substantially independent of an existing source at the same site.

New Source Performance Standards (NSPS): effluent limitations for new direct dischargers based on the best available demonstrated control technology. NSPS represents the greatest degree of effluent reduction attainable through the application of the best available demonstrated control technology for all pollutants (i.e., conventional, nonconventional, and priority pollutants). In establishing NSPS, EPA considers the cost of achieving the effluent reduction and any non-water quality environmental impacts and energy requirements.

Pretreatment Standards for New Sources (PSNS): pretreatment standards for new indirect dischargers, designed to prevent discharges of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTWs. Addresses all pollutants (i.e., conventional, nonconventional, and priority pollutants). Based on the same factors as are considered in promulgating NSPS.

Producer Price Index (PPI): a family of indexes that measures the average change over time in the selling prices received by domestic producers of goods and services. PPI's measure price change from the perspective of the seller. This contrasts with other measures, such as the Consumer Price Index (CPI), that measure price change from the purchaser's perspective. Sellers' and purchasers' prices may differ due to government subsidies, sales and excise taxes, and distribution costs. (http://stats.bls.gov/ppifaq.htm#1)

ACRONYMS

NSPS: New Source Performance Standards
PPI: Producer Price Index
PSNS: Pretreatment Standards for New Sources

REFERENCES

U.S. Bureau of Labor Statistics, Producer Price Index Revision-Current Series. On-line database at http://stats.bls.gov/ppihome.htm.

U.S. Environmental Protection Agency (U.S. EPA). 2003. *Technical Development Document for the Final Effluent Limitations Guidelines and Standards for the Metal Products & Machinery Point Source Category*. February.

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Chapter 10: Small Entity Impact Assessment

INTRODUCTION

CHAPTER CONTENTS

The Regulatory Flexibility Act ***(RFA)***, as amended by the Small Business Regulatory Enforcement Fairness Act (***SBREFA***), requires EPA to consider the economic impacts a rule will have on ***small entities***. RFA/SBREFA requires an agency to prepare a ***Regulatory Flexibility Analysis*** for any rule subject to notice and comment rulemaking requirements, unless the Agency certifies that the rule will not have a significant economic impact on a substantial number of small entities (Small Business Regulation Enforcement Fairness Act of 1996, P.L. 104-121, Section 243).

The economic analysis prepared for the 1995 MP&M Phase I proposal indicated that large numbers of small facilities could be impacted by the rule and that a significant number of publically-owned treatment works ***(POTWs)*** would also be affected by the rule.

EPA addressed this issue by crafting the final rule to exclude as many small facilities as possible while still covering as much of the pollutant discharge as possible. With this in mind, EPA sought, from the beginning, to design a combined phase regulation that would not unreasonably burden small entities.

To ensure that all small entities were considered in developing the MP&M regulation, EPA developed, administered, and analyzed questionnaires for all entities that could potentially be affected, including: privately- and government-owned facilities that would have to comply with the regulation, and POTWs that receive MP&M discharges. The Agency balanced several factors when defining the final rule, including:

- the predominance of small entities in the MP&M industry,
- the pounds of pollutants discharged by large and small facilities,
- the toxicity of the pollutants discharged by large and small facilities,
- the need for additional reduction in effluent discharges from the MP&M industry,
- the need to achieve these reductions without imposing unreasonable burdens on small entities, and
- the need to minimize burden on POTWs.

Given the large number of small entities that could be affected by the final rule, EPA undertook detailed analyses of potential small entity impacts and carefully considered the findings from this analysis in defining the final rule. From these assessments and based on the coverage and requirements of the final rule, EPA concluded that the final rule will not have a significant economic impact on a substantial number of small entities. EPA has therefore not prepared a Regulatory Flexibility Analysis. The following sections of this chapter describe the methodology and results of EPA's small entity impact assessment, and discuss EPA's consideration of small entity impacts in designing the rule.

10.1 Defining Small Entities

EPA identified small entities using Small Business Administration ***(SBA)*** size threshold guidelines.[1] These thresholds define the minimum firm-level employment or revenue size, by industry (four-digit SIC codes), below which a business qualifies as a ***small business*** under SBA guidelines. The SBA guidelines also set a threshold for small public sector entities. A ***small government*** is one that serves a population of 50,000 or less. MP&M facilities were determined to be owned by a small entity if the parent firm or government fell below the SBA threshold.

The SBA guidelines for businesses use either employment or revenue to measure size, depending on the specific four-digit SIC industry. Manufacturing industries generally have employment size thresholds, while non-manufacturing industries typically have revenue size thresholds. EPA used employment-based thresholds for the manufacturing portion of each MP&M sector, and separate non-manufacturing thresholds for sectors that include non-manufacturing activities (e.g., maintenance and repair).

EPA selected the SBA threshold occurring most frequently among each sector's four-digit SIC codes as the sector threshold.[2] Table 10.1 presents the resulting employment size thresholds for manufacturers.

Table 10.1: Small Business MP&M Sector Thresholds for Manufacturers

MP&M Sector	Employees
Aerospace	1,000
Aircraft	1,000
Bus and Truck	500
Electronic Equipment	750
Hardware	500
Household Equipment	500
Instrument	500
Job Shop	500
Mobile Industrial Equipment	500
Motor Vehicle	500
Office Machine	1,000
Ordnance	1,000
Other Metal Products	500
Precious and Non.Precious Metals	500
Printed Circuit Board	500
Railroad	1,000
Ship and Boat	1,000
Stationary Industrial Equipment	500
Steel Forming & Finishing	1,000

Source: SBA and U.S. EPA analysis.

[1] The SBA website provides the most recent size thresholds at http://www.sba.gov/regulations/siccodes.

[2] The SBA thresholds for four-digit SICs were not used directly because the Phase II §308 survey reports revenues by MP&M sector but does not report facility SIC codes.

Table 10.2 presents the employment size thresholds for non-manufacturers, which are based on revenue except for the railroad sector. Some sectors do not have non-manufacturing industries and do not appear in this table.

Table 10.2: Small Business MP&M Sector Thresholds for Non-Manufacturers

MP&M Sector	Revenue
Aircraft	$5,000,000
Bus and Truck	$5,000,000
Household Equipment	$5,000,000
Instrument	$5,000,000
Motor Vehicle[a]	$5,000,000
Office Machine	$18,000,000
Other Metal Products	$5,000,000
Precious and Non-Precious Metals	$5,000,000
Railroad	1,500[b]
Ship and Boat[c]	$5,000,000
Stationary Industrial Equipment	$5,000,000

[a] Also has a threshold of 100 employees.
[b] Employees.
[c] Also has a threshold of 500 employees.

Source: SBA and U.S. EPA analysis.

EPA classified facilities as manufacturing or non-manufacturing and selected an MP&M sector threshold based on the sector from which they received the most revenue, as reported in the §308 surveys.[3] EPA then compared the firm-level employment or revenue for the firm owning each facility to the appropriate manufacturing or non-manufacturing threshold for that sector.

The Phase II survey asked each respondent to provide firm-level employment and revenue data. The Phase I survey also asked for firm-level revenue but not for firm employment. This omission did not matter in the case of single facility businesses, where the facility's reported employment is the firm-level employment. For multiple-facility firms in the Phase I survey, EPA estimated firm-level employment by assuming that the number of employees per revenue dollar for the firm was the same as the employees per dollar at the facility. Thus,

$$E_{firm} = E_{facility} \times \frac{R_{firm}}{R_{facility}} \qquad (10.1)$$

where:

E_{firm} = firm-level employment,
$E_{facility}$ = facility-level employment,
R_{firm} = firm-level revenue, and
$R_{facility}$ = facility-level revenue.

EPA identified facilities operated by governments that serve a population of 50,000 or fewer as being operated by small government entities. The §308 municipal survey responses provided population data in most cases, which EPA supplemented using the Bureau of the Census online 1990 Population Census database (Bureau of the Census.)

[3] The §308 MP&M surveys did not collect firm-level revenues by sector and therefore cannot be used to assign a unique sector to each firm. The assignment of a threshold was therefore based on the facility-level revenues by sector.

10.2 METHODOLOGY

EPA used several impact measures for its small entity impact analysis. First, EPA reviewed the results of the facility impact analyses described in Chapter 5 according to business size to determine whether facilities owned by small entities are disproportionately subject to moderate impacts at the facility level. Second, EPA calculated the ratio of annualized compliance costs to facility revenues and examined the distribution of this ratio for facilities owned by small versus large firms.

The analysis excluded facilities that the facility impact analysis identifies as baseline failures (see Chapter 5).

10.3 RESULTS

10.3.1 Number of Affected Small Entities

There are an estimated 40,265 MP&M facilities nationwide (excluding baseline closures). A large number of these facilities are owned by small entities, based on SBA thresholds. Table 10.3 shows the total number of facilities operating in the baseline and the number owned by small entities. Overall, 73 percent of all MP&M facilities are owned by small entities.

Table 10.3: Number and Percent of MP&M Facilities Owned by Small Entities

Type of Facility	Number of Facilities of all Sizes Operating in the Baseline	Number of Facilities Owned by Small Entities	Percent of Facilities Owned by Small Entities
Owned by small business	36,480	27,418	75%
Owned by small government	3,785	1,962	52%
Total owned by small entities[a]	40,265	29,380	73%

[a] Excludes baseline closures.

Source: U.S. EPA analysis.

EPA has limited the scope of the final rule to MP&M facilities performing oily operations. Table 10.4 shows that only a small percentage (five percent) of small entities are potentially subject to regulation. The final rule excludes a large percentage (95 percent) of small entity-owned MP&M facilities from regulation.

Table 10.4: Percent of Facilities Owned by Small Entities Excluded under the Final Option

Type of Facility	Number of Facilities Operating in the Baseline	Number of Facilities Not Subject to the Final Rule	Percentage of Facilities Not Subject to the Final Rule
Owned by small business	27,418	26,368	96%
Owned by small government	1,962	1,682	86%
Total owned by small entities	29,380	28,050	95%

Source: U.S. EPA analysis.

10.3.2 Impacts on Facilities Owned by Small Entities

The facility impact analysis findings provide the first measure EPA used to assess impacts on facilities owned by small entities. No facilities, small or large, are projected to close or experience moderate impacts as a result of the final rule. A second approach to assessing small entity impacts – based on a comparison of compliance costs to post-compliance revenues – indicates that no facilities will incur costs exceeding 1 percent of revenues, and only 1,019 facilities owned by small private businesses will incur any costs at all. This corresponds to 3.7 percent of the facilities owned by small private businesses that operate in the baseline.

Table 10.5 summarizes the results of the facility impact analysis for facilities owned by small entities for the final rule and the options considered by EPA.

Table 10.5: Closures and Moderate Impacts for Facilities Owned by Small Entities

	Final Option	Option II	Option III	Option IV
Number of facilities operating in the baseline	29,380	29,380	29,380	29,380
Number of facilities excluded from option	28,050	23,893	27,118	26,907
Percent excluded	95.5%	81.3%	92.3%	91.6%
Number of facilities with closures	0	813	109	109
Facilities with closures as a percent of facilities operating in the baseline	0.0%	2.8%	0.4%	0.4%
Facilities with closures as a percent of regulated facilities	0.0%	14.8%	4.8%	4.4%
Number of facilities with moderate impacts	0	0	37	37
Facilities with moderate impacts as a percent of facilities operating in the baseline	0.0%	0.0%	0.1%	0.1%
Facilities with moderate impacts as a percent of regulated facilities	0.0%	0.0%	1.6%	1.5%

Source: U.S. EPA analysis.

In summary, no facilities owned by small entities that operate in the baseline are expected to close or experience moderate impacts under the final rule.

Table 10.6 shows the results of the second approach to assessing small entity impacts, based on a comparison of compliance costs with facility revenues. EPA conducted this analysis only for MP&M facilities owned by private entities (i.e., businesses, but not governments), because of the low level of impacts on all sizes of governments.

Table 10.6: After-Tax Annual Compliance Costs as a Percent of Annual revenues under the Final Option for Facilities Owned by Private Small Businesses[a]

Discharge Status	Number of Facilities Owned by Small Private Businesses Operating in the Baseline	Number and Percent of Facilities Owned by Small Businesses that are Not Regulated		Number and Percent of Facilities Owned by Small Businesses with After-Tax Annual Compliance Costs/Annual Revenues Equal to:					
				No Cost		More than 0% and less than 1%		Over 1%	
		Number	%	Number	%	Number	%	Number	%
Direct	1,168	119	13.9%	31	2.5%	1,019	83.6%	0	0.0%
Indirect	26,253	26,253	100.0%	0	0.0%	0	0.0%	0	0.0%
Total[b]	27,418	26,368	96.2%	31	0.1%	1,019	3.7%	0	0.0%

[a] Includes only facilities that remain open in the baseline.
[b] The sum of the number of direct and indirect dischargers does not add up to the total because some facilities are both indirect and direct dischargers.

Source: U.S. EPA analysis.

Of the facilities owned by small entities that operate in the baseline, 96.2 percent are not regulated under the final rule. Another 0.1 percent are regulated but do not incur costs. The remaining 3.7 percent incur compliance costs but none incur after-tax annualized costs exceeding 1 percent of annual revenue. These results are consistent with the finding that no facilities owned by small business will close or experience moderate financial impacts.

10.3.3 Impacts on Small Firms

EPA also performed a firm-level analysis in which it compared compliance costs with revenue at the firm level as a measure of compliance cost burden. EPA applied this analysis only for facilities owned by private entities (i.e., businesses, but not governments). Table 10.7 shows the results of this comparison. The Agency was not able to estimate national numbers of firms that own MP&M facilities precisely, because the sample weights based on the survey design represent numbers of facilities rather than firms. Most of the facilities owned by small firms (25,297 of 27,578, or 92 percent) are single-facility firms, however. These single-facility firms can be analyzed using sample weights. In addition, 85 small multi-facility firms own at least one sample facility. These firms are included in the analysis but with a sample weight of one, since it is not known how many sample firms these 85 small firms represent. The results shown in Table 10.7 therefore represent a total of 25,382 small MP&M firms (25,297 + 85).

Table 10.7: Firm Level Before-Tax Annual Compliance Costs as a Percent of Annual Revenues for Private Small Businesses

Number of Small Firms in the Analysis[a]	Number and Percent with Before-Tax Annual Compliance Costs/Annual Revenues Equal to:					
	0% (no costs)		>0% and <1%		Over 1%	
	Number	%	Number	%	Number	%
25,382	24,363	95.99%	1,019	4.01%	0	0%

[a] Firms whose only MP&M facilities close in the baseline are excluded.

Source: U.S. EPA analysis.

The vast majority, 96 percent, of the small businesses in the analysis incur no costs due to the rule. The remaining 4 percent, equal to 1,019 firms, incur before-tax compliance costs of less than 1% of their after-tax revenues. Of these 1,019 small firms, none were reported in the facility impact analysis to experience moderate impacts due to the final rule.

10.4 Consideration of Small Entity Impacts in Developing the Final Rule

EPA gave special consideration to impacts on small entities in defining the final regulation. In particular, EPA attempted to minimize impacts on small entities while at the same time meeting Clean Water Act objectives of reducing pollutant discharges to the nation's waterways. The final rule minimizes impacts on small entities primarily by excluding all indirect dischargers and direct dischargers in all subcategories except Oily Wastes.

Table 10.8 shows the number and percentage of facilities owned by small versus large entities that are projected to close or experience moderate impacts under the final and alternative regulatory options analyzed by EPA in developing the final regulation.

Table 10.8: Percent of Facilities Estimated to Close or Experience Moderate Impacts by Owning Entity Size Class and by Regulatory Option

Regulatory Option and Type of Facility	Number of Facilities				
	Subject to Regulation	Projected to Close	Percent Closing	Experiencing Moderate Impacts	Percent with Moderate Impacts
Final Regulatory Option					
Owned by Small Entities	1,330	0	0.0%	0	0.0%
Owned by Large Entities	1,052	0	0.0%	0	0.0%
Total	2,382	0	0.0%	0	0.0%
Option II					
Owned by Small Entities	5,487	813	14.8%	0	0.0%
Owned by Large Entities	2,863	0	0.0%	0	0.0%
Total	8,350	813	9.7%	0	0.0%
Option III					
Owned by Small Entities	2,262	109	4.8%	37	1.6%
Owned by Large Entities	1,182	0	0.0%	0	0.0%
Total	3,444	109	0.5%	37	1.1%
Option IV					
Owned by Small Entities	2,473	109	4.4%	37	1.5%
Owned by Large Entities	1,453	0	0.0%	12	0.8%
Total	3,926	109	2.8%	49	1.2%

Source: U.S. EPA analysis.

As reported in the table, the final rule avoids entirely the more material impacts on small entities that likely would have occurred under the alternative regulatory options.

In addition to avoiding impacts in the regulated community, the final rule, by excluding indirect discharging facilities from revised limits, also eliminated the potential additional burden to POTWs, including small POTWs, from issuance of new and revised permits. Chapter 11 and Appendix F discuss POTW administrative activities and costs under the four regulatory options.

GLOSSARY

Regulatory Flexibility Analysis: an evaluation of the impact of a rule and alternative regulatory options on small entities.

small entity: a business, government or non-profit organization defined as small for EPA's RFA/SBREFA evaluation.

small business: a business with employment or revenue below the threshold specified by the Small Business Administration for each 4-digit SIC.

small government: a government that serves a population of 50,000 or less, as defined by the Small Business Administration.

ACRONYMS

POTW: Publicly-owned treatment works
RFA: Regulatory Flexibility Act
SBA: Small Business Administration
SBREFA: Small Business Regulatory Enforcement Fairness Act

REFERENCES

U.S. Department of Commerce, Bureau of the Census. Statistics of U.S. Businesses.

U.S. Small Business Administration. http://www.sba.gov/regulations/siccodes.

Chapter 11: Social Costs

INTRODUCTION

This chapter presents EPA's estimates of the regulation's costs to society. Previous chapters described the economic impacts of the final rule in terms of facility closures and moderate financial impacts, employment losses, community impacts, international trade effects, financial impacts on firms owning MP&M facilities, and impacts on small entities. The economic impact analyses were based on the estimated costs to MP&M facilities of complying with the regulation. These costs of labor, equipment, material, and other economic resources needed for regulatory compliance are also the major component of the cost to society of the regulation. Other components of social costs include costs to governments administering the regulation, and the social costs associated with unemployment resulting from facility closures.

CHAPTER CONTENTS

Section 11.1 provides an overview of the three components of social cost analyzed for this regulation: the cost of society's economic resources used to comply with the rule; the cost to governments of administering the rule; and the social costs of unemployment resulting from the rule. The next three sections discuss each of these three components of social cost in more detail. The last section, Section 11.5, summarizes the estimated total social costs.

11.1 COMPONENTS OF SOCIAL COSTS

The ***social costs*** of regulatory actions are the ***opportunity costs*** to society of employing scarce resources in pollution prevention and pollution control activities. The social costs of regulation include both monetary and non-monetary outlays made by society. Monetary outlays include the resource costs of compliance, government administrative costs, and other adjustment costs, such as the cost of relocating displaced workers. Non-monetary outlays, some of which can be assigned monetary values, include losses in consumers' and producers' surplus in affected product markets, the adverse effects of involuntary unemployment, possible loss of time (e.g., delays in investment decisions), and possible adverse impacts on the rate of innovation.

To assess the MP&M regulation's social costs, EPA relied first on the estimated costs to MP&M facilities for the labor, equipment, material, and other economic resources needed to comply with the regulation. The compliance costs used to estimate total social costs differ from those used to assess facility- and firm-level economic impacts in their consideration of taxes and revenue effects. In the facility and firm impact analysis, compliance costs are measured as they affect the financial performance of regulated facilities and firms. The analyses therefore explicitly consider the tax deductibility of compliance expenditures.[1] In the analysis of costs to society, however, these compliance costs are considered on a before-tax basis. In general, because tax deductibility reduces the burden of compliance expenditures to private firms, the estimated compliance costs are greater from the perspective of society than from the perspective of private industry. In addition, the analysis of the regulation's impact on regulated facilities and firms accounted for potential recovery of compliance costs through output price increases. The assessment of social cost ignores these potential cost offsets because, like taxes, they represent only a transfer of compliance costs from the complying entity and not a true reduction in compliance cost.

Social costs also include lost producers' and consumers' surplus that result from reduction in the quantity of goods and services produced. Lost ***producers' surplus*** is measured as the difference between revenues earned and the cost of production for the lost production. Lost ***consumers' surplus*** is the difference between the price paid by consumers for the lost production and the maximum amount they would have been willing to pay for those goods and services.

[1] Costs incurred by government facilities are not adjusted for taxes, since these facilities are not subject to income taxes.

Accurate calculation of lost producers' and consumers' surplus requires knowledge of market supply and demand characteristics for each affected industry. EPA was not able to conduct an industry-specific partial equilibrium analysis of changes in market prices and output, both because of the very large number of markets involved and because it was not possible to link compliance costs to specific products at multi-sector facilities.

EPA's assessment of social cost includes two additional cost elements: the cost to governments of administering permitting and compliance monitoring activities under the regulation, and the social costs associated with unemployment that may result from facility closures. The unemployment-related costs include the cost of administering unemployment programs for workers who are projected to lose employment (but not the cost of unemployment benefits, which are a transfer payment within society); and an estimate of the amount that workers would be willing to pay to avoid involuntary unemployment.

11.2 Resource Costs of Compliance

This section reviews the resource costs of compliance for the final rule and the costs for the alternative regulatory options considered by EPA. The resource costs of compliance are the value of society's productive resources – including labor, equipment, and materials – expended to achieve the reductions in effluent discharges required by the regulation. The social costs of these resources are higher than the financial burden borne by facilities because facilities are able to deduct the costs from their taxable income and may be able to recover some of the costs through price increases to customers. The costs to society, however, are the full value of the resources used, whether paid for by the regulated facilities, by taxpayers in the form of lost tax revenues, or by customers through increased prices. EPA included no costs for facilities assessed as baseline closures.

EPA estimated after-tax annualized compliance costs of $11.9 million for the final regulation (see *Chapter 5: Facility Impact Analysis*, Table 5.6). The estimated social value of these compliance costs, however, is $13.8 million, as shown in Table 11-1. This amount represents the value to society of the resources that would be used to comply with the rule.

For the alternative regulatory options, EPA's estimates included compliance costs both for facilities estimated to close because of the rule and for facilities estimated to continue operating under the regulation. This approach results in an upper-bound estimate of the social costs of compliance, since the lost value incurred by closing facilities is presumably less than the estimated cost of compliance.[2]

Under the Proposed/NODA Option, annual compliance costs amount to $1,111.4 million for indirect dischargers and $508.9 million for direct dischargers (2001$). The total annualized compliance costs are $1,620.3 million, or approximately 117 times the compliance costs under the final rule. This cost increase results from including additional subcategories under the Proposed/NODA Option. General Metals indirect dischargers, which are excluded from the final regulation, account for approximately 40 percent of the total compliance costs under the Proposed/NODA Option.

Under the Directs + 413 to 433 Upgrade Option, annual compliance costs amount to $83.0 million for indirect dischargers and $13.8 million for direct dischargers (2001$). The total annualized compliance costs are $96.8 million, or approximately 7 times the final rule's compliance costs. This cost increase results from requiring indirect dischargers that currently comply with the standards of 413 to upgrade to 433 standards. General Metals facilities, which are excluded from the final regulation, account for approximately 44 percent of the total compliance costs under this option.

Under the Directs + All to 433 Upgrade Option, annual compliance costs amount to $124.4 million for indirect dischargers and $13.8 million for direct dischargers (2001$). The total annualized compliance costs are $138.2 million, or approximately 10 times the compliance costs under the final rule. This cost increase results from requiring general metals facilities that currently comply local limit standards to upgrade to 433 standards. General Metals facilities, which are excluded from the final regulation, account for approximately 61 percent of the total compliance costs under this option.

[2] Including costs for regulatory closures yields an estimate of social costs assuming that every facility continued to operate post-regulation. Calculating costs as if all facilities continue operating will overstate social costs if some facilities find it more economical to close than comply with the regulation.

Table 11.1: Resource Value of Compliance Costs (millions, 2001$)

Subcategory	Indirect	Direct	Total
Option I: Selected Option (Directs Only)			
General Metals	$0.0	$0.0	$0.0
MF Job Shop	$0.0	$0.0	$0.0
Non Chromium Anodizing	$0.0	$0.0	$0.0
Oily Wastes	$0.0	$13.8	$13.8
Printed Wiring Boards	$0.0	$0.0	$0.0
Railroad Rebuilders	$0.0	$0.0	$0.0
Shipbuilding Dry Docks	$0.0	$0.0	$0.0
Total	**$0.0**	**$13.8**	**$13.8**
Option II: Proposed/NODA Option			
General Metals	$652.9	$396.1	$1,049.0
MF Job Shop	$185.2	$4.6	$189.8
Non Chromium Anodizing	$0	$38.0	$38.0
Oily Wastes	$92.8	$35.9	$128.7
Printed Wiring Boards	$157.9	$0.3	$158.2
Railroad Rebuilders	$0.0	$0.7	$0.7
Shipbuilding Dry Docks	$0.0	$3.2	$3.2
Steel Forming & Finishing	$22.6	$30.1	$52.7
Total	**$1,111.4**	**$508.9**	**$1,620.3**
Option III: Directs + 413 to 433 Upgrade Option			
General Metals	$42.4	$0.0	$42.4
MF Job Shop	$17.1	$0.0	$17.1
Non Chromium Anodizing	$0.0	$0.0	$0.0
Oily Wastes	$0.0	$13.8	$13.8
Printed Wiring Boards	$23.5	$0.0	$23.5
Railroad Rebuilders	$0.0	$0.0	$0.0
Shipbuilding Dry Docks	$0.0	$0.0	$0.0
Total	**$83.0**	**$13.8**	**$96.8**
Option IV: Directs + All to 433 Upgrade Option			
General Metals	$83.8	$0.0	$83.8
MF Job Shop	$17.1	$0.0	$17.1
Non Chromium Anodizing	$0.0	$0.0	$0.0
Oily Wastes	$0.0	$13.8	$13.8
Printed Wiring Boards	$23.5	$0.0	$23.5
Railroad Rebuilders	$0.0	$0.0	$0.0
Shipbuilding Dry Docks	$0.0	$0.0	$0.0
Total	**$124.4**	**$13.8**	**$138.2**

Source: U.S. EPA analysis.

11.3 POTW Administration Costs

This section discusses the POTW administrative costs of the final rule and the costs of the alternatives considered by EPA. EPA estimates that the final rule will not increase POTW administrative costs. EPA expects no increase in permitting costs for facilities that already hold a permit in the baseline. However, governments will incur additional permitting costs from (1) permitting of unpermitted facilities (under the NODA/Proposal option only) and (2) acceleration of repermitting for some indirect dischargers that currently hold permits. The alternative regulatory options may also cause some administrative costs to decrease. For example, control authorities will no longer have to repermit facilities that are estimated to close as a result of the MP&M rule.

Table 11.2 shows the number of facilities requiring a new permit under the four options considered for the final rule. Only the NODA/Proposal option would require POTWs to issue new concentration-based permits for the first time. None of the options considered would require a new mass-based permit or a conversion from a concentration-based to a mass-based permit. The table also shows the number of facilities that will require early repermitting (within three years rather than within five years), the number of estimated regulatory closures, and the total number of facilities that are expected to require permits under the different regulatory options.

Table 11.2: Permitting Requirements for Regulatory Alternatives (number of indirect discharging facilities)

Permitting required:	Option I: Selected Option	Option II: NODA/Proposal Option	Option III: Directs + 413 to 433 Upgrade	Option IV: Directs + All to 433 Upgrade
New concentration-based permit	n/a	103	0	0
New mass-based permit[a]	n/a	0	0	0
Convert from existing concentration-based to mass-based[a]	n/a	0	0	0
Repermit within 3 rather than 5 years	n/a	1,434	382	566
Regulatory closures (no longer requiring permits)[b]	n/a	722	120	120
Number of facilities operating post-regulation requiring a permit	n/a	3,687	954	1,414

[a] EPA does not require mass-based permits under any of the option considered for the final rule.
[b] Some facilities with existing permits will no longer require permitting due to regulatory closures.

Source: U.S. EPA analysis.

Table 11.3 below presents the estimated permitting costs to governments of administering the final rule and alternative options. *Chapter 7: Government and Community Impact Analysis* describes the methodology used to estimate these administrative costs.

Because the final regulation excludes from coverage all indirect dischargers, EPA estimates that the final rule will not increase POTW administrative costs. Each of the three alternative regulatory options considered would result in *reduced* POTW regulatory costs. These cost savings result from regulatory closures (i.e., facilities that currently hold a permit and would have required repermitting in the baseline, but that will no longer require repermitting under the regulatory options). The cost savings from regulatory closures outweigh the additional costs for issuing new permits (under the NODA/Proposal option only) and repermitting on an accelerated, three-year schedule. Estimated annualized cost savings to POTWs for the three alternative regulatory options range between $0.05 and $1.0 million under the NODA/Proposal option, and between $0.03 and $0.2 million under the Directs + 413 to 433 Upgrade option and the Directs + 413+50%LL Upgrade option (all costs in ($2001).

Table 11.3: Annualized Government Administrative Costs by Regulatory Option ($2001)

Option	Low	Medium	High
Option I: Selected Option (Directs Only)	n/a	n/a	n/a
Option II: Proposed/NODA Option	($46,000)	($198,000)	($1,027,000)
Option III: Directs + 413 to 433 Upgrade Option	($26,000)	($56,000)	($218,000)
Option IV: Directs + All to 433 Upgrade Option	($26,000)	($55,000)	($213,000)

Source: U.S. EPA analysis.

11.4 SOCIAL COSTS OF UNEMPLOYMENT

This section discusses the social costs of unemployment associated with the final rule and the alternatives EPA considered. The loss of jobs from facility closures would represent a social cost of the regulation. However, from its facility impact analysis, EPA estimates that no facilities will close as a result of the regulation. EPA did not recognize possible savings in unemployment-related costs from jobs created by the rule as a negative cost (benefit) of the regulation. Accordingly, EPA estimates a zero cost of unemployment for the final rule.

Chapter 6: Employment Effects discusses the effects of the alternative regulatory options on employment, including the jobs potentially lost due to facility closures and the jobs potentially created by expenditures to comply. This section estimates the social cost of the estimated changes in employment. EPA considered two components of the social cost of unemployment:

- The cost of worker dislocation (exclusive of cash benefits) to unemployed individuals, as measured by their willingness to pay to avoid unemployment; and
- The additional cost to governments to administer unemployment benefits programs.

11.4.1 Social Cost of Worker Dislocation

EPA calculated the cost of worker dislocation based on an estimate of the value that workers would pay to avoid involuntary job losses. The amount that workers would pay to avoid a job loss was derived from hedonic studies of the compensation premium required by workers to accept jobs with a higher probability of unemployment. This framework has been used in the past to impute a trade-off between wages and job security (Topel, 1984; Adams, 1985; Anderson and Chandran, 1987). Specifically, this estimate approximates a one-time willingness-to-pay to avoid an involuntary episode of unemployment and reflects all monetary and non-monetary impacts of involuntary unemployment incurred by the worker. It does not include any offsets to the cost of unemployment, such as unemployment compensation or the value of increased leisure time.

Studies by Topel (1984) and Adams (1985) suggest that the compensation premium for accepting a one percent increase in the annual probability of unemployment is in the range of 2.5 percent to 3.3 percent of the base compensation value. To illustrate this finding, assume that a worker is presented with a choice between two employment opportunities: one with compensation of $30,000 per year and an annual unemployment probability of zero, and a second otherwise equivalent opportunity but with an annual unemployment probability of one percent. For the worker to accept the second opportunity, his or her compensation must be at least 2.5 to 3.3 percent greater than the $30,000 offered for the first opportunity, or at least $30,750 to $30,990 (depending on the percentage premium used). In this case, the dollar premium required to accept the additional one percent annual probability of unemployment is $750 to $990.

For analyzing the unemployment-related costs of the MP&M regulation, the hypothetical choice is assumed to be between an employment opportunity with a zero percent annual probability of unemployment and a second opportunity with a 100 percent annual probability of unemployment. In this case, the one-time premium for accepting the employment opportunity with the 100 percent probability of employment is assumed to be 250 to 330 percent of the compensation for the otherwise

comparable employment opportunity with the assumed zero probability of employment.[3] To estimate the premium for an increase in the probability of unemployment requires an estimate of the average compensation to workers in the MP&M industry. EPA calculated an average annual compensation for MP&M industry production workers of $38,309 (2001$)[4] Accordingly, the annual compensation premium for a one percentage point increase in the annual probability of unemployment would be $958 to $1,264 and the cost of a 100 percent probability event would be $95,772 to $126,420 (2001$). This calculation assumes that the cost of a certainty unemployment event is directly proportional to the increase in probability from the low probability event (i.e., one percent) on which the calculation is based.

Chapter 6: Employment Effects presents EPA's estimate that as many as 32,729 jobs might be lost due to facility closures under the Proposed/NODA Option. Multiplying these 32,729 job losses by the estimated range of willingness-to-pay values for avoiding unemployment results in a total cost of unemployment for the Proposed/NODA Option of $3.1 billion to $4.1 billion (2001$). EPA annualized these values over a 15-year period at a 7 percent rate, yielding an annualized cost of $344 to $454 million. These values are the annualized amounts over a 15-year period that workers would be willing to pay to avoid the job losses projected to result from compliance with the Proposed/NODA Option.

EPA estimates that as many as 7,874 jobs might be lost due to facility closures under the Directs + 413 to 433 Upgrade Option and the Directs + All to 433 Upgrade Option. Multiplying these 7,874 job losses by the estimated range of willingness-to-pay values for avoiding unemployment results in a total cost of unemployment for both of the 433 Upgrade Options of $754 million to $995 million (2001$). EPA annualized these values over a 15-year period at a 7 percent rate, yielding an annualized cost of $83 to $109 million.

11.4.2 Cost of Administering Unemployment Benefits Programs

Unemployment as the result of regulation also imposes costs on society through the additional administrative burdens placed on the unemployment system. The cost of unemployment benefits *per se* is not a social cost but instead a transfer payment within society from taxpayers to the unemployed. Administrative costs include the cost of processing unemployment claims, retraining workers, and placing workers in new jobs. Data obtained from the Interstate Conference of Employment Security Agencies indicated that the cost of administering an initial unemployment claim over the period 1991-1993 averaged $93.25 (1991$-1993$). These costs included total Federal and State funding for administering unemployment benefit programs but not the cost of the benefits themselves. Inflating this estimate to 2001 dollars using the BLS Employment Cost Index for and Local Government workers yields a value of $122 per claim.[5] Based on this estimate, EPA assumed that the cost of administering unemployment programs would amount to approximately $122 per job loss. Multiplying this figure by the estimated loss of 32,729 jobs under the Proposed/NODA Option yields an additional $4.0 million in social costs. EPA annualized this value over the 15-year analysis period at a 7 percent rate to yield an annual cost of approximately $438,027 (2001$). Multiplying the per job loss estimate of the cost of administering unemployment by the estimated loss of 7,874 jobs under the 433 Upgrade Options yields almost an additional $960,000 in social costs. EPA annualized these values over the 15-year analysis period at a 7 percent rate to yield an annual cost of $105,000 under the 433 Upgrade Options.

11.4.3 Total Cost of Unemployment

As mentioned above, EPA did not estimate a cost of unemployment for the final rule because no job loss is expected. As shown in Table 11.4 below, the 32,729 estimated job losses at facility closures under the Proposed/NODA Option have an estimated social cost of $345 million to $455 million (2001$). The 7,874 estimated job losses at facility closures under the 433 Upgrade Options have an estimated social cost of $83 million to $109 million (2001$).

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[3] This analysis has a considerable artificiality in that a worker would not realistically be presented with this choice. The artificiality of the choice in turn underscores the very strong assumption in the analysis. That is, that the cost of an unemployment event can be estimated by linearly extrapolating the premium estimated for small percentage differences in the probability of unemployment to a circumstance in which the probability of unemployment is 100 percent. An investigation of literature on unemployment failed to find an alternative method for estimating unemployment costs. This analytic issue warrants further research.

[4] Calculated the total payroll ($407.7 billion) / total employment (12.2 million) in MP&M SIC codes based on data obtained from the 1997 Economic Censuses which is $33,508. Inflated this estimate to 2001 dollars using the BLS Seasonally Adjusted Employment Cost Index (ECI) for Private Industry Manufacturing - 1997 (4th Qtr): 135.4, 2001 (4th Qtr): 154.8.

[5] BLS, 2000. Table 1a: Employment Cost Index (Compensation), State and Local Government: 1992 (December): 118.5, 1999 (December): 144.2.

Table 11.4: Total Annual Social Costs of Unemployment (millions, 2001$)

Social Cost of Unemployment Categories	Option I: Selected Option (Directs Only)	Option II: Proposed/NODA Option	Option III: Directs + 413 to 433 Upgrade	Option IV: Directs + All to 433 Upgrade
Employment Loss in Closing Facilities	**n/a**	**32,729**	**7,874**	**7,874**
Annualized Worker Dislocation Cost				
Low Unit Cost (based on 2.5 percent premium)	n/a	$344.16	$82.80	$82.80
High Unit Cost (based on 3.3 percent premium)	n/a	$454.29	$109.30	$109.30
Annualized Unemployment Administration Cost (million 2001$)	n/a	$0.44	$0.11	$0.11
Sum, Worker Dislocation and Unemployment Administration Costs (based on employment loss in closing facilities)				
Low Value	n/a	$344.60	$82.91	$82.91
High Value	n/a	$454.73	$109.40	$109.40

Source: U.S. EPA analysis.

11.5 TOTAL SOCIAL COSTS

Summing across the final rule's social cost components results in a total social cost estimate of $13.8 million annually (2001$), as shown in Table 11.5. The total social costs of the Proposed/NODA Option range between $2.0 billion and $2.1 billion. The total social costs for the Directs + 413 to 433 Upgrade Option range between $180 million and $206 million. The total social costs for the Directs + All to 433 Upgrade Option range between $221 million and $247 million.

Table 11.5: Total Social Cost (millions, 2001$)

Social Cost Categories	Option I: Selected Option (Directs Only)	Option II: Proposed/NODA Option		Option III: Directs + 413 to 433 Upgrade		Option IV: Directs + All to 433 Upgrade	
		Low	High	Low	High	Low	High
Resource cost of compliance expenditures	$13.8	$1,620.3		$96.8		$138.2	
Costs to POTWs of administering the rule	$0.0	($0.05)	($1.0)	($0.03)	($0.2)	($0.03)	($0.2)
Social costs of unemployment	$0.0	$344.6	$454.7	$82.9	$109.4	$82.9	$109.4
Total Social Cost	**$13.8**	**$1,964.8**	**$2,074.0**	**$179.7**	**$206.0**	**$221.1**	**$247.4**

Source: U.S. EPA analysis.

GLOSSARY

consumers' surplus: the value that consumers derive from goods and services above the price they have to pay to obtain the goods and services.

opportunity cost: the lost value of alternative uses of resources (capital, labor and raw materials) used in pollution control activ ities.

producers' surplus: the difference between what producers' earn on their output and the economic costs of producing that output, including a normal return on capital.

social costs: the costs incurred by society as a whole as a result of the final rule; does not include costs that are simply transfers among parties but that do not represent a net cost overall.

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